



MMWRTM

Morbidity and Mortality Weekly Report

www.cdc.gov/mmwr

Recommendations and Reports

July 24, 2009 / Vol. 58 / No. RR-7

Recommended Community Strategies and Measurements to Prevent Obesity in the United States

The *MMWR* series of publications is published by the Coordinating Center for Health Information and Service, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30333.

Suggested Citation: Centers for Disease Control and Prevention. [Title]. *MMWR* 2009;58(No. RR-#):[inclusive page numbers].

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Recommended Community Strategies and Measurements to Prevent Obesity in the United States

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Summary

Approximately two thirds of U.S. adults and one fifth of U.S. children are obese or overweight. During 1980–2004, obesity prevalence among U.S. adults doubled, and recent data indicate an estimated 33% of U.S. adults are overweight (body mass index [BMI] 25.0–29.9), 34% are obese (BMI ≥30.0), including nearly 6% who are extremely obese (BMI ≥40.0). The prevalence of being overweight among children and adolescents increased substantially during 1999–2004, and approximately 17% of U.S. children and adolescents are overweight (defined as at or above the 95% percentile of the sex-specific BMI for age growth charts). Being either obese or overweight increases the risk for many chronic diseases (e.g., heart disease, type 2 diabetes, certain cancers, and stroke). Reversing the U.S. obesity epidemic requires a comprehensive and coordinated approach that uses policy and environmental change to transform communities into places that support and promote healthy lifestyle choices for all U.S. residents. Environmental factors (including lack of access to full-service grocery stores, increasing costs of healthy foods and the lower cost of unhealthy foods, and lack of access to safe places to play and exercise) all contribute to the increase in obesity rates by inhibiting or preventing healthy eating and active living behaviors. Recommended strategies and appropriate measurements are needed to assess the effectiveness of community initiatives to create environments that promote good nutrition and physical activity. To help communities in this effort, CDC initiated the Common Community Measures for Obesity Prevention Project (the Measures Project). The objective of the Measures Project was to identify and recommend a set of strategies and associated measurements that communities and local governments can use to plan and monitor environmental and policy-level changes for obesity prevention. This report describes the expert panel process that was used to identify 24 recommended strategies for obesity prevention and a suggested measurement for each strategy that communities can use to assess performance and track progress over time. The 24 strategies are divided into six categories: 1) strategies to promote the availability of affordable healthy food and beverages, 2) strategies to support healthy food and beverage choices, 3) a strategy to encourage breastfeeding, 4) strategies to encourage physical activity or limit sedentary activity among children and youth, 5) strategies to create safe communities that support physical activity, and 6) a strategy to encourage communities to organize for change.

Introduction

Obesity rates in the U.S. have increased dramatically over the last 30 years, and obesity is now epidemic in the United States. Data for 2003–2004 and 2005–2006 indicated that approximately two thirds of U.S. adults and one fifth of U.S. children were either obese (defined for adults as having a body mass index [BMI] ≥30.0) or overweight (defined for adults as BMI of 25.0–29.9 and for children as at or above the 95%

percentile of the sex-specific BMI for age-growth charts) (1,2). Among adults, obesity prevalence doubled during 1980–2004, and recent data indicate that an estimated 33% of U.S. adults are overweight and 34% are obese, including nearly 6% are extremely obese (defined as BMI ≥40.0) (3,4). Being either obese or overweight increases the risk for many chronic diseases (e.g., heart disease, type 2 diabetes, some cancers, and stroke). Although diet and exercise are key determinants of weight, environmental factors beyond the control of individuals (including lack of access to full-service grocery stores, high costs of healthy foods, and lack of access to safe places to play and exercise) contribute to increased obesity rates by reducing the likelihood of healthy eating and active living behaviors (5–7).

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States and communities are responding to the obesity epidemic in the United States by working to create environments that support healthy eating and active living (8,9) and by giving public health practitioners and policy makers an opportunity to learn from community-based efforts to prevent obesity. However, the absence of measurements to assess policy and environmental changes at the community level has impeded efforts to assess the implementation of these types of population-level initiatives for preventing obesity. To address this issue, CDC initiated the Common Community Measures for Obesity Prevention Project (the Measures Project). The goal of the Measures Project was to identify and recommend a set of obesity prevention strategies and corresponding suggested measurements that local governments and communities can use to plan, implement, and monitor initiatives to prevent obesity. For the purposes of the Measures Project, a measurement is defined as a single data element that can be collected through an objective assessment of policies or the physical environment and that can be used to quantify the performance of an obesity prevention strategy. Community was defined as a social entity that can be classified spatially on the basis of where persons live, work, learn, worship, and play (e.g., homes, schools, parks, roads, and neighborhoods).

The Measures Project process was guided by expert opinion and included a systematic review of the published scientific literature, resulting in the adoption of 24 recommended environmental and policy level strategies to prevent obesity. This report presents the first set of comprehensive recommendations published by CDC to promote healthy eating and active living and reduce the prevalence of obesity in the United States. This report describes each of the recommended strategies, summarizes available evidence regarding their effectiveness, and presents a suggested measurement for each strategy that communities can use to assess implementation and track progress over time.

Methods

The recommended strategies presented in this document were developed as a result of a systematic process grounded in available evidence for each strategy, expert opinion, and detailed documentation of the project process and decision-making rationale. A few exploratory strategies for which no evidence was available were included in the recommendations on the basis of expert opinion and to determine the effectiveness of the strategy for preventing obesity.

The Common Community Measures for Obesity Prevention Project Team (the Measures Project Team) comprised CDC staff, who maintained primary decision-making authority of the project; the CDC Foundation, which provided administra-

tive and fiscal oversight for the Project; ICF Macro, a public health consulting firm that served as the coordinating center for the project; Research Triangle Institute, a public health consulting firm that acted as the coordinating center during the preliminary phase of the project; and the International City/County Management Association (ICMA), which provided local government expertise. Multiple subgroups* provided input and guidance to the Measures Project Team on specific aspects of the project:

- the Funders Steering Committee provided guidance on project funding and resources
- a Select Expert Panel of nationally recognized content-area experts in areas of urban planning, built environment, obesity prevention, nutrition, and physical activity assisted in the selection of the recommended strategies and measurements;
- a CDC Workgroup comprising representatives from multiple divisions of CDC provided input on the identification, nomination, and selection of the recommended strategies;
- a Measurement Expert group reviewed the selected measurements for technical precision on their structure, phrasing, and content;
- local government experts provided knowledge of city management, resources, and perspective on the utility, feasibility, and practicality of the strategies and measurements for local government capacity and needs; and
- CDC Technical Advisors provided guidance on the project design and protocol.

Step 1: Strategy Identification

To identify potential environmental and policy-level strategies for obesity prevention, the Measures Project Team searched PubMed for reviews and meta-analyses published during January 1, 2005–July 3, 2007 using the following search terms:

- (“nutrition” or “food”) AND (“community” or “environment” or “policy”) AND (“obesity” or “overweight” or “chronic disease”) and
- (“physical activity” or “exercise”) AND (“community” or “environment” or “policy”) AND (“obesity” or “overweight” or “chronic disease”).

The Measures Project Team conducted a literature search over a relatively short publication period (2 years) because reviews and meta-analyses were assumed to contain and summarize research that was published before 2005. The PubMed search yielded 270 articles. On the basis of a preliminary review, 176

*A list of the members of these groups appears on the inside back cover of this report.

articles were deemed inappropriate because they did not focus on environmental or policy-level change, resulting in a total of 94 articles. Seven additional reports and studies recognized as “seminal documents” also were recommended for inclusion (8,10–15). The Measures Project Team completed a full review of the 94 articles and seven seminal documents, resulting in the identification of 791 potential obesity prevention strategies. Similar and overlapping strategies were collapsed, resulting in a final total of 179 environmental or policy-level strategies for obesity prevention.

Step 2: Strategy Prioritization and Selection

To assist in prioritizing the 179 strategies identified in the literature search, the Measures Project Team developed a set of strategy rating criteria based on the efforts of similar projects (16–21). Through an online survey, members of the Select Expert Panel rated each obesity prevention strategy on the following criteria: reach, mutability, transferability, potential effect size, and sustainability of the health impact (Box 1).

The Select Expert Panel met to discuss and rank order the strategies on the basis of the results of the online survey. The Panel identified 47 strategies as most promising, including 26 nutrition strategies, 17 physical activity strategies, and four other obesity-related strategies. Next, the CDC Workgroup met to review the strategies from a public health perspective, which resulted in the selection of 46 strategies. The Measures Project Team then identified 22 policy- and environmental-level strategies that were given the highest priority for preventing obesity at the community level. In addition, three

BOX 1. Criteria used by the Select Expert Panel to rate each proposed strategy to reduce obesity in the United States

Criterion	Description
Reach	The strategy is likely to affect a large percentage of the target population.
Mutability	The strategy is in the realm of the community's control.
Transferability	The strategy can be implemented in communities that differ in size, resources, and demographics.
Effect size	The potential magnitude of the health effect for the strategy is meaningful.
Sustainability of health impact	The health effect of the strategy will endure over time.

strategies were added to be consistent with CDC's state-based Nutrition and Physical Activity Program to Prevent Obesity. One additional strategy was added on the basis of expert opinion supporting the need for exploratory policy and environmental strategies that consider local food systems and the production, procurement, and distribution of healthier foods for community consumption. A total of 26 environmental and policy strategies for obesity prevention were selected to move forward to the measurement nomination and selection phase of the project process.

Step 3: Summarization

After the 26 strategies were selected, the Measures Project Team created a summary for each strategy that included an overview of the strategy, a summary of available evidence in support of the strategy, and potential measurements that were used to assess the strategy as described in the literature. When available, the summaries also included examples of how the strategy has been used by local communities.

Step 4: Measurement Nomination and Selection

Content area experts specializing in nutrition, physical activity, and other obesity-related behaviors assisted the Measures Project Team in selecting potential measurements that communities can use to assess the recommended obesity prevention strategies. Three persons were assigned to each strategy according to their area of expertise. Each three-person group included at least one member of the CDC Workgroup and one external member of the Select Panel; for many strategies, a local government expert recruited by ICMA also participated. Experts reviewed the strategy summary and nominated up to three potential measurements per strategy. Experts also rated each measurement as high, medium, or low for three criteria: utility, construct validity, and feasibility (Box 2).

After potential measurements were nominated, the experts were convened via teleconference to select a first- and second-choice measurement for that strategy. Each nominated measurement was discussed briefly, and experts had the opportunity to refine the measurement or create a new measurement before voting on the first- and second-choice measurements. After the teleconferences, the Measures Project Team reviewed the proposed first and second choice measurements to ensure they were feasible for local governments to collect and that the use of definitions and wording were consistent.

Next, a panel of six measurement experts (two from CDC, two from the Select Expert Panel, and two from ICMA) specializing in measurement development and evaluation reviewed the measurements for utility, construct validity, and

BOX 2. Criteria used by content area experts to rate suggested measurements for each strategy

Criterion	Description
Utility	The measurement serves the information needs of communities enabling them to plan and monitor community-level programs and strategies.
Construct validity	The measurement accurately assesses the environmental strategy or policy that it is intended to measure.
Feasibility	The measurement can be collected and used by local government (e.g. cities, counties, towns) without the need for surveys, access to proprietary data, specialized equipment, complex analytical techniques and expertise, or unrealistic resource expenditure.

feasibility and provided suggestions for improvement. The Measures Project Team reviewed the measurement experts' suggestions and made minor modifications to the measurements on the basis of their feedback. None of the concerns raised by the Measurement Experts warranted exclusion of any of the first-choice measurements. Two additional changes were made after a further review by the Measures Project Team and a technical review by CDC's Division of Nutrition, Physical Activity, and Obesity: 1) the first-choice measurement for the personal safety strategy was replaced with the second-choice measurement which focused more appropriately on assessing environmental and policy-level change; and 2) two similar pricing strategies for healthier foods and beverages and for fruits and vegetables were merged. This resulted in a total of 25 recommended strategies and a corresponding suggested measurement for each strategy.

Step 5: Pilot Test and Final Revisions

Twenty local government representatives, including city managers, urban planners, and budget analysts, who participate in ICMA's Center for Performance Measurement (CPM), volunteered to pilot test the selected measurements. To limit the burden of the pilot test for individual local government participants the communities were divided into three groups, each of which included a mix of small, medium, and large communities. Each group was assigned eight or nine measurements

pertaining to both nutrition and physical activity. In addition, the local government participants also were asked to provide general feedback on their ability to report on each measurement, the level of effort required to gather the necessary data, and the perceived utility of each measurement. Demographic information also was obtained to compare the responses and feedback among communities of similar size and population. The communities were given 6 weeks to complete the pilot test. Responses and feedback from the pilot test were summarized by ICMA and served as the basis of discussions at an end-user meeting that was held in January 2009.

The end-user meeting was facilitated by the Measures Project Team and was attended by the local government representatives who had pilot tested the measurements, members of the Select Expert Panel, and CDC content and measurement experts. The results of the pilot test were presented at the meeting; the overall response was positive. A number of challenges associated with responding to the measurements and suggestions for improvement were identified, as a result of which, minor word changes and clarifications were made to 13 measurements. Three measurements were modified to include additional venues for data collection, such as schools or local government facilities. In addition, four substantive changes were made to the measurements: 1) the measurement related to school siting was changed to be more focused on assessing environmental and policy-level change; 2) the focus of the measurement related to enhancing personal safety in areas where persons are physically active was changed from street lighting to vacant buildings, which experts believed to be a more meaningful indicator of personal safety; 3) the measurement related to increasing the availability of supermarkets, including full-service grocery stores, was modified to focus on the number of stores located in underserved census tracts rather than the percentage of supermarkets within easy walking distance of a transit stop; and 4) the measurement related to increasing affordability of healthier foods and beverages was combined and replaced by the measurement related to pricing strategies. These modifications resulted in a total of 24 recommended environmental and policy level obesity prevention strategies and their corresponding suggested measurement (Table).

The recommended strategies and corresponding suggested measurements are grouped in six categories; for each strategy, a summary is provided that includes an overview of the strategy, followed by a summary of evidence that supports the strategy and the corresponding suggested measurement for the strategy. Key terms used throughout this report have been defined separately (see Appendix for a complete listing of these terms). Communities wishing to adopt these CDC recommendations and report on these suggested measurements should refer to the detailed implementation and measurement guide, which

TABLE. Summary of recommended community strategies and measurements to prevent obesity in the United States**Strategies to Promote the Availability of Affordable Healthy Food and Beverages**

Strategy 1	Communities should increase availability of healthier food and beverage choices in public service venues.
Suggested measurement	A policy exists to apply nutrition standards that are consistent with the dietary guidelines for Americans (US Department of Health and Human Services, US Department of Agriculture. Dietary guidelines for Americans. 6th ed. Washington, DC: U.S. Government Printing Office; 2005.) to all food sold (e.g., meal menus and vending machines) within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.
Strategy 2	Communities should improve availability of affordable healthier food and beverage choices in public service venues.
Suggested measurement	A policy exists to affect the cost of healthier foods and beverages (as defined by the Institute of Medicine [IOM] [Institute of Medicine. Preventing childhood obesity: health in the balance. Washington, DC: The National Academies Press; 2005]) relative to the cost of less healthy foods and beverages sold within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.
Strategy 3	Communities should improve geographic availability of supermarkets in underserved areas.
Suggested measurement	The number of full-service grocery stores and supermarkets per 10,000 residents located within the three largest underserved census tracts within a local jurisdiction.
Strategy 4	Communities should provide incentives to food retailers to locate in and/or offer healthier food and beverage choices in underserved areas.
Suggested measurement	Local government offers at least one incentive to new and/or existing food retailers to offer healthier food and beverage choices in underserved areas.
Strategy 5	Communities should improve availability of mechanisms for purchasing foods from farms.
Suggested measurement	The total annual number of farmer-days at farmers' markets per 10,000 residents within a local jurisdiction.
Strategy 6	Communities should provide incentives for the production, distribution, and procurement of foods from local farms.
Suggested measurement	Local government has a policy that encourages the production, distribution, or procurement of food from local farms in the local jurisdiction.

Strategies to Support Healthy Food and Beverage Choices

Strategy 7	Communities should restrict availability of less healthy foods and beverages in public service venues.
Suggested measurement	A policy exists that prohibits the sale of less healthy foods and beverages (as defined by IOM [Institute of Medicine. Preventing childhood obesity: health in the balance. Washington, DC: The National Academies Press; 2005]) within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.
Strategy 8	Communities should institute smaller portion size options in public service venues.
Suggested measurement	Local government has a policy to limit the portion size of any entree (including sandwiches and entrée salads) by either reducing the standard portion size of entrees or offering smaller portion sizes in addition to standard portion sizes within local government facilities within a local jurisdiction.
Strategy 9	Communities should limit advertisements of less healthy foods and beverages.
Suggested measurement	A policy exists that limits advertising and promotion of less healthy foods and beverages within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.
Strategy 10	Communities should discourage consumption of sugar-sweetened beverages.
Suggested measurement	Licensed child care facilities within the local jurisdiction are required to ban sugar-sweetened beverages, including flavored/sweetened milk and limit the portion size of 100% juice.

Strategy to Encourage Breastfeeding

Strategy 11	Communities should increase support for breastfeeding.
Suggested measurement	Local government has a policy requiring local government facilities to provide breastfeeding accommodations for employees that include both time and private space for breastfeeding during working hours.

TABLE. (Continued) Summary of recommended community strategies and measurements to prevent obesity in the United States**Strategies to Encourage Physical Activity or Limit Sedentary Activity Among Children and Youth**

Strategy 12	Communities should require physical education in schools.
Suggested measurement	The largest school district located within the local jurisdiction has a policy that requires a minimum of 150 minutes per week of PE in public elementary schools and a minimum of 225 minutes per week of PE in public middle schools and high schools throughout the school year (as recommended by the National Association of Sports and Physical Education).
Strategy 13	Communities should increase the amount of physical activity in PE programs in schools.
Suggested measurement	The largest school district located within the local jurisdiction has a policy that requires K–12 students to be physically active for at least 50% of time spent in PE classes in public schools.
Strategy 14	Communities should increase opportunities for extracurricular physical activity.
Suggested measurement	The percentage of public schools within the largest school district in a local jurisdiction that allow the use of their athletic facilities by the public during non-school hours on a regular basis.
Strategy 15	Communities should reduce screen time in public service venues.
Suggested measurement	Licensed child care facilities within the local jurisdiction are required to limit screen viewing time to no more than 2 hours per day for children aged ≥ 2 years.

Strategies to Create Safe Communities That Support Physical Activity

Strategy 16	Communities should improve access to outdoor recreational facilities.
Suggested measurement	The percentage of residential parcels within a local jurisdiction that are located within a half-mile network distance of at least one outdoor public recreational facility.
Strategy 17	Communities should enhance infrastructure supporting bicycling.
Suggested measurement	Total miles of designated shared-use paths and bike lanes relative to the total street miles (excluding limited access highways) that are maintained by a local jurisdiction.
Strategy 18	Communities should enhance infrastructure supporting walking.
Suggested measurement	Total miles of paved sidewalks relative to the total street miles (excluding limited access highways) that are maintained by a local jurisdiction.
Strategy 19	Communities should support locating schools within easy walking distance of residential areas.
Suggested measurement	The largest school district in the local jurisdiction has a policy that supports locating new schools, and/or repairing or expanding existing schools, within easy walking or biking distance of residential areas.
Strategy 20	Communities should improve access to public transportation.
Suggested measurement	The percentage of residential and commercial parcels in a local jurisdiction that are located either within a quarter-mile network distance of at least one bus stop or within a half-mile network distance of at least one train stop (including commuter and passenger trains, light rail, subways, and street cars).
Strategy 21	Communities should zone for mixed use development.
Suggested measurement	Percentage of zoned land area (in acres) within a local jurisdiction that is zoned for mixed use that specifically combines residential land use with one or more commercial, institutional, or other public land uses.
Strategy 22	Communities should enhance personal safety in areas where persons are or could be physically active.
Suggested measurement	The number of vacant or abandoned buildings (residential and commercial) relative to the total number of buildings located within a local jurisdiction.
Strategy 23	Communities should enhance traffic safety in areas where persons are or could be physically active.
Suggested measurement	Local government has a policy for designing and operating streets with safe access for all users which includes at least one element suggested by the national complete streets coalition (http://www.completestreets.org)

Strategy to Encourage Communities to Organize for Change

Strategy 24	Communities should participate in community coalitions or partnerships to address obesity.
Suggested measurement	Local government is an active member of at least one coalition or partnership that aims to promote environmental and policy change to promote active living and/or healthy eating (excluding personal health programs such as health fairs).

includes measurement data protocols, community-level examples, and useful resources for strategy implementation; this guide is available at: <http://www.cdc.gov/nccdphp/dnpao/publications/index.html>.

Recommended Strategies and Measurements to Prevent Obesity

Strategies to Promote the Availability of Affordable Healthy Food and Beverages

For persons to make healthy food choices, healthy food options must be available and accessible. Families living in low-income and minority neighborhoods often have less access to healthier food and beverage choices than those in higher-income areas. Each of the following six strategies aims to increase the availability of healthy food and beverage choices, particularly in underserved areas.

1. Communities Should Increase Availability of Healthier Food and Beverage Choices in Public Service Venues

Overview

Limited availability of healthier food and beverage options can be a barrier to healthy eating and drinking. Healthier food and beverage choices include, but are not limited to, low energy dense foods and beverages with low sugar, fat, and sodium content (11). Schools are a key venue for increasing the availability of healthier foods and beverages for children. Other public service venues positioned to influence the availability of healthier foods include after-school programs, child care centers, community recreational facilities (e.g., parks, playgrounds, and swimming pools), city and county buildings, prisons, and juvenile detention centers. Improving the availability of healthier food and beverage choices (e.g., fruits, vegetables, and water) might increase the consumption of healthier foods.

Evidence

CDC's Community Guide reports insufficient evidence to determine the effectiveness of multicomponent school-based nutrition initiatives designed to increase fruit and vegetable intake and decrease fat and saturated fat intake among school-aged children (22,23). However, systematic research reviews have reported an association between the availability of fruits and vegetables and increased consumption (24,25). Farm-to-school salad bar programs, which deliver produce from

local farms to schools, have been shown to increase fruit and vegetable consumption among students (12). A 2-year randomized control trial of a school-based environmental intervention that increased the availability of lower-fat foods in cafeteria à la carte areas indicated that sales of lower-fat foods increased among adolescents attending schools exposed to the intervention (26).

Suggested measurement

A policy exists to apply nutrition standards that are consistent with the Dietary Guidelines for Americans (27) to all food sold (e.g., meal menus and vending machines) within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.

This measurement captures whether local governments and/or public schools are applying nutrition standards that are consistent with the Dietary Guidelines for Americans to foods sold in local government facilities and/or public schools (27). Communities that do not use the Dietary Guidelines for Americans can still meet the measurement criteria if they follow other standards that are similar to or stronger than the national standards.

2. Communities Should Improve Availability of Affordable Healthier Food and Beverage Choices in Public Service Venues

Overview

Healthier foods generally are more expensive than less-healthy foods (28), which can pose a significant barrier to purchasing and consuming healthier foods, particularly for low-income consumers. Healthier foods and beverages include, but are not limited to, foods and beverages with low energy density and low calorie, sugar, fat, and sodium content (11). Healthier food and beverage choices need to be both available and affordable for persons to consume them.

Strategies to improve the affordability of healthier foods and beverages include lowering prices of healthier foods and beverages and providing discount coupons, vouchers redeemable for healthier foods, and bonuses tied to the purchase of healthier foods. Pricing strategies create incentives for purchasing and consuming healthier foods and beverages by lowering the prices of such items relative to less healthy foods. Pricing strategies that can be applied in public service venues (e.g., schools and recreation centers) include, but are not limited to, decreasing the prices of healthier foods sold in vending machines and in cafeterias and increasing the price of less healthy foods and beverages at concession stands.

Evidence

Research has demonstrated that reducing the cost of healthier foods increases the purchase of healthier foods (29,30). For example, one study indicated that sales of fruits and carrots in high-school cafeterias increased after prices were reduced (31). In addition, interventions that reduced the price of healthier, low-fat snacks in vending machines in school and work settings have been demonstrated to increase purchasing of healthier snacks (32,33). A recent study estimated that a subsidized 10% price reduction on fruits and vegetables would encourage low-income persons to increase their daily consumption of fruits from 0.96 cup to 0.98–1.01 cups and increase their daily consumption of vegetables from 1.43 cups to 1.46–1.50 cups, compared with the recommended 1.80 cups of fruits and 2.60 cups of vegetables (34).

Furthermore, interventions that provide coupons redeemable for healthier foods and bonuses tied to the purchase of healthier foods increase purchase and consumption of healthier foods in diverse populations, including university students, recipients of services from the Supplemental Nutrition Program for Women, Infants, and Children (WIC), and low-income seniors (35–37). For example, one community-based intervention indicated that WIC recipients who received weekly \$10 vouchers for fresh produce increased their consumption of fruits and vegetables compared with a control group and sustained the increase 6 months after the intervention (38).

Suggested measurement

A policy exists to affect the cost of healthier foods and beverages (as defined by IOM [11]) relative to the cost of less healthy foods and beverages sold within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.

This measurement captures pricing policies that promote the purchase of healthier foods and beverages sold in local government facilities and public schools. Efforts to affect the relative cost of healthier food relative to the cost of less healthy foods can include increasing the cost of less healthy foods and beverages, setting a lower profit margin on healthier foods and beverages, or taking other actions that result in healthier foods and beverages being less expensive than (or at least no more expensive than) less healthy foods and beverages. The goal of such a policy would be to eliminate cost disincentives or provide cost incentives for the purchase of healthier foods and beverages.

3. Communities Should Improve Geographic Availability of Supermarkets in Underserved Areas

Overview

Supermarkets and full-service grocery stores have a larger selection of healthy food (e.g., fruits and vegetables) at lower prices compared with smaller grocery stores and convenience stores. However, research suggests that low-income, minority, and rural communities have fewer supermarkets as compared with more affluent areas (39,40). Increasing the number of supermarkets in areas where they are unavailable or where availability is limited is might increase access to healthy foods, particularly for economically disadvantaged populations.

Evidence

Greater access to nearby supermarkets is associated with healthier eating behaviors (39). For example, a cross-sectional study of approximately 10,000 participants indicated that blacks living in neighborhoods with at least one supermarket were more likely to consume the recommended amount of fruits and vegetables than blacks living in neighborhoods without supermarkets. Further, blacks consumed 32% more fruits and vegetables for each additional supermarket located in their census tract (41). Another study indicated that increasing the number of supermarkets in underserved neighbors increased real estate values, increased economic activity and employment, and resulted in lower food prices (42).

One cross-sectional study linked height and weight data from approximately 70,000 adolescents to data on food store availability (43). The results indicated that, after controlling for socioeconomic status, greater availability of supermarkets was associated with lower adolescent BMI scores and that a higher prevalence of convenience stores was related to higher BMI among students. The association between supermarket availability and weight was stronger for black students and for students whose mothers worked full-time (43).

Suggested measurement

The number of full-service grocery stores and supermarkets per 10,000 residents located within the three largest underserved census tracts within a local jurisdiction.

This measurement examines the availability of full-service grocery stores and supermarkets in underserved areas. Given that research has shown that low-income, minority communities tend to have fewer grocery stores than other areas, underserved areas are defined geographically for the purpose of this measurement as census tracts with higher percentages of low-income and/or high minority populations. Because some jurisdictions have numerous census tracts that meet the

underserved criteria, the measurement limits the assessment to the three largest (i.e., those with the largest population) underserved census tracts within a local jurisdiction for the purpose of community cross-comparisons. The measurement is expected to illuminate areas that lack a sufficient number of full-service grocery stores and supermarkets to serve the population in those areas. Although no standard benchmark exists for this measurement, data collected from local governments reporting on this measurement can lead to establishment of a standard.

4. Communities Should Provide Incentives to Food Retailers to Locate in and/or Offer Healthier Food and Beverage Choices in Underserved Areas

Overview

Healthier foods and beverages include but are not limited to foods and beverages with low energy density and low calorie, sugar, fat, and sodium content as defined by IOM (11). Disparities in the availability of healthier foods and beverages between communities with different income levels, ethnic composition, and other characteristics are well documented, and limited availability of healthier food and beverage choices in underserved communities constitutes a substantial barrier to improving nutrition and preventing obesity (41).

To address this issue, communities can provide incentives to food retailers (e.g., supermarkets, grocery stores, convenience and corner stores, and street vendors) to offer a greater variety of healthier food and beverage choices in underserved areas. Such incentives, both financial and nonfinancial, can be offered to encourage opening new retail outlets in areas with limited shopping options, and existing corner and convenience stores (which typically depend on sales of alcohol, tobacco, and sugar-sweetened beverages) into neighborhood groceries selling healthier foods (44). Financial incentives include but are not limited to tax benefits and discounts, loans, loan guarantees, and grants to cover start-up and investment costs (e.g., improving refrigeration and warehouse capacity). Nonfinancial incentives include supportive zoning, and increasing the capacity of small businesses through technical assistance in starting up and maintaining sales of healthier foods and beverages.

Evidence

The presence of retail venues that provide healthier foods and beverages is associated with better nutrition. Cross-sectional studies indicate that the presence of retail venues offering healthier food and beverage choices is associated with increased consumption of fruits and vegetables and lower BMI (45). One study indicated that every additional supermarket within a given census tract was associated with a 32% increase

in the amount of fruits and vegetables consumed by persons living in that census tract (40). Another study indicated that greater availability of supermarkets was associated with lower adolescent BMI scores and a higher prevalence of convenience stores was related to higher BMI among students (43). The association between supermarket availability and weight was stronger for black students compared with white and Hispanic students, and stronger for students whose mothers work full-time compared with those whose mothers work part-time or do not work (43).

Suggested measurement

Local government offers at least one incentive to new and/or existing food retailers to offer healthier food and beverage choices as defined by IOM (11) in underserved areas.

This measurement assesses a wide range of incentives, both financial and nonfinancial, that local jurisdictions offer to food retailers to encourage the availability of healthier food and beverage choices in underserved areas. For the purpose of this measurement underserved areas are those identified by communities as having limited food retail outlets, and the available outlets (e.g., convenience stores and liquor stores) tend not to offer many healthy foods and beverages. The measurement is designed to capture incentives designed to entice new healthy food retailers to locate in underserved areas and to encourage existing food retailers to expand their selection of healthier food and beverage choices. The measurement does not prescribe the incentives that a local government should offer but rather assesses whether a local government is making an effort to improve the availability of healthier food and beverage choices in underserved areas.

5. Communities Should Improve Availability of Mechanisms for Purchasing Foods from Farms

Overview

Mechanisms for purchasing food directly from farms include farmers' markets, farm stands, community-supported agriculture, "pick your own," and farm-to-school initiatives. Experts suggest that these mechanisms have the potential to increase opportunities to consume healthier foods, such as fresh fruits and vegetables, by possibly reducing costs of fresh foods through direct sales; making fresh foods available in areas without supermarkets; and harvesting fruits and vegetables at ripeness rather than at a time conducive to shipping, which might improve their nutritional value and taste (M. Hamm, PhD, Michigan State University, personal communication, 2008).

Evidence

Evidence supporting a direct link between purchasing foods from farms and improved diet is limited. Two studies of initiatives to encourage participation in the Seniors Farmers' Market Nutrition Program (46) and the WIC Farmers' Market Nutrition Program (47) report either increased intention to eat more fruits and vegetables or increased utilization of the program; however, neither study reported direct evidence that the programs resulted in increased consumption of fruits and vegetables. The Farmers' Market Salad Bar Program in the Santa Monica–Malibu Unified School District aims to increase students' consumption of fresh fruits and vegetables and to support local farmers by purchasing produce directly from local farmers' markets and serving them in the district's school lunch program. An evaluation of the program over a 2-year period demonstrated that 30%–50% of students chose the salad bar on any given day (48). Access to farm foods varies between agricultural and metropolitan areas.

Suggested Measurement

The total annual number of farmer-days at farmers' markets per 10,000 residents within a local jurisdiction.

This measurement assesses opportunities to sell and purchase food from local farms based on the number of days per year that farmers' markets are open and the number of farm vendors that sell food at those outlets. Although farmers' markets are only one mechanism for purchasing food from farms, they are considered by experts to be strong proxies of other, less common ways to purchase food from local farms, such as community-supported agriculture and "pick your own" programs. Information on farmer-days is collected on an ongoing basis by the managers of farmers' markets. The process of gathering information for this measurement might encourage more interaction between local governments and farmers' markets and individual farmers, which could spur more local initiatives to support local food production and purchasing food from local farms. Although no estimated standard exists for this measurement, data collected from local governments reporting on this measurement can lead to establishment of a standard.

6. Communities Should Provide Incentives for the Production, Distribution, and Procurement of Foods from Local Farms

Overview

Currently the United States is not producing enough fruits, vegetables, whole grains, and dairy products for all U.S. citizens to eat the quantities of these foods recommended by the USDA Dietary Guidelines for Americans (27,49). Providing incentives

to encourage the production, distribution, and procurement of food from local farms aims might increase the availability and consumption of locally produced foods by community residents, enhance the ability of the food system to provide sufficient quantities of healthier foods, and increase the viability of local farms and food security for communities (M. Hamm, PhD, Michigan State University, personal communication, 2008). Definitions of "local" vary by place and context but may include the area of the foodshed (i.e. a geographic area that supplies a population center with food), food grown within a day's driving distance of the place of sale, or a smaller area such as a city and its surroundings. Incentives to encourage local food production can include forming grower cooperatives, instituting revolving loan funds, and building markets for local farm products through economic development and through collaborations with the Cooperative Extension Service (50). Additional incentives include but are not limited to farmland preservation, marketing of local crops, zoning variances, subsidies, streamlined license and permit processes, and the provision of technical assistance.

Evidence

Evidence suggests that dispersing agricultural production in local areas around the country (e.g., through local farms and urban agriculture) would increase the amount of produce that could be grown and made available to local consumers, improve economic development at the local level (51,52), and contribute to environmental sustainability (53). Although no evidence has been published to link local food production and health outcomes, a study has been funded to explore the potential nutritional and health benefits of eating locally grown foods (A. Ammerman, DrPH, University of North Carolina Center for Health Promotion and Disease Prevention, personal communication, 2009).

Suggested measurement

Local government has a policy that encourages the production, distribution, or procurement of food from local farms in the local jurisdiction.

This measurement captures local policies, as well as state- and federal-level policies that apply to a local jurisdiction and aim to encourage the production, distribution, and procurement of food from local farms. The measurement does not specify the content of relevant policies so that all policies designed to increase the production, distribution, and consumption of food from local farms may be included in the measure.

Strategies to Support Healthy Food and Beverage Choices

Even when healthy food options are available, children and families often remain inundated with unhealthy food and beverage choices promoted by television advertisements and print media. In addition, unhealthy foods typically cost less than healthy foods, providing further economic incentives for their purchase and consumption. Each of the following four strategies aims to encourage consumers to make healthier choices by limiting exposure and access to less healthy food and beverage options.

7. Communities Should Restrict Availability of Less Healthy Foods and Beverages in Public Service Venues

Overview

Less healthy foods and beverages include foods and beverages with a high calorie, fat, sugar, and sodium content, and a low nutrient content. Less healthy foods are more available than healthier foods in U.S. schools (54). The availability of less healthy foods in schools is inversely associated with fruit and vegetable consumption and is positively associated with fat intake among students (55). Therefore, restricting access to unhealthy food options is one component of a comprehensive plan for better nutrition.

Schools can restrict the availability of less healthy foods by setting standards for the types of foods sold, restricting access to vending machines, banning snack foods and food as rewards in classrooms, prohibiting food sales at certain times of the school day, or changing the locations where unhealthy competitive foods are sold. Other public service venues that could also restrict the availability of less healthy foods include after-school programs, regulated child care centers, community recreational facilities (e.g., parks, recreation centers, playgrounds, and swimming pools), city and county buildings, and prisons and juvenile detention centers.

Evidence

No peer-reviewed studies were identified that examined the impact of interventions designed to restrict the availability of less healthy foods in public service venues. Federal nutritional guidelines prohibit the sale of foods of “minimal nutritional value” in school cafeterias while meals are being served. However, the guidelines currently do not prevent or restrict the sale of these foods in vending machines near the cafeteria or in other school locations (11). Certain states and school districts have developed more restrictive policies regarding competitive foods; 21 states have policies that restrict the sale of competitive

foods beyond USDA regulations (56). However, no studies were identified that examined the impact of the policies in those states on student eating behavior.

Suggested measurement

A policy exists that prohibits the sale of less healthy foods and beverages (as defined by IOM [11]) within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.

This measurement captures all policies designed to restrict the availability of less healthy foods and beverages sold in local government facilities and in public schools.

8. Communities Should Institute Smaller Portion Size Options in Public Service Venues

Overview

Portion size can be defined as the amount (e.g. weight, calorie content, or volume) of a single food item served in a single eating occasion (e.g. a meal or a snack), such as the amount offered to a person in a restaurant, in the packaging of prepared foods, or the amount a person chooses to put on his or her plate (23). Controlling portion size is important because research has demonstrated that persons often either 1) do not notice differences in portion sizes and unknowingly eat larger amounts when presented with a larger portion or 2) when eating larger portions, do not consume fewer calories at subsequent meals or during the rest of the day (57).

Evidence

Evidence is lacking to demonstrate the effectiveness of population-based interventions aimed at reducing portion sizes in public service venues. However, evidence from clinical studies conducted in laboratory settings demonstrates that decreasing portion size decreases energy intake (58–60). This finding holds across a wide variety of foods and different types of portions (e.g., portions served on a plate, sandwiches, or prepackaged foods such as potato chips). Clinical studies conducted in nonlaboratory settings demonstrate that increased portion size leads to increased energy intake (61,62). The majority of studies that evaluated the impact of portion size on nutritional outcomes were short term, producing little evidence regarding the long-term impact of portion size on eating patterns, nutrition, and obesity (23). Intervention studies are underway that evaluate the impact of limiting portion size, combined with other strategies to prevent obesity in workplaces (63).

Suggested measurement

Local government has a policy to limit the portion size of any entree (including sandwiches and entrée salads) by either reducing the standard portion size of entrees or offering smaller portion sizes in addition to standard portion sizes within local government facilities within a local jurisdiction.

This measurement captures local government policies that aim to limit or reduce the portion size of entrées served in local government facilities. This measurement is limited to local government facilities, which represent only a small portion of the total landscape of food service venues but are within the influence of local jurisdictions. This measurement might prompt communities to consider policies that limit the portion size of entrees served in facilities that are owned and operated within a local jurisdiction.

9. Communities Should Limit Advertisements of Less Healthy Foods and Beverages

Overview

Research has demonstrated that more than half of television advertisements viewed by children and adolescents are food-related; the majority of them promote fast foods, snack foods, sweets, sugar-sweetened beverage products, and other less healthy foods that are easily purchased by youths (11). In 2006, major food and beverage marketers spent \$1.6 billion to promote food and beverage products among children and adolescents in the United States (64). Television advertising has been determined to influence children to prefer and request high-calorie and low-nutrient foods and beverages and influences short-term consumption among children aged 2–11 years (65). Therefore, limiting advertisements of less healthy foods might decrease the purchase and consumption of such products. Legislation to limit advertising of less healthy foods and beverages usually is introduced at the federal or state level. However, local governing bodies, such as district level school boards, might have the authority to limit advertisements of less healthy foods and beverages in areas within their jurisdiction (9).

Evidence

Little evidence is available regarding the impact of restricting advertising on purchasing and consumption of less healthy foods (11,22,66,67). However, cross-sectional time-series studies of tobacco-control efforts suggest that an association exists between advertising bans and decreased tobacco consumption (22,68). One study estimated that a ban on fast-food advertising on children's television programs could reduce the number of overweight children aged 3–11 years by 18% and the num-

ber of overweight adolescents aged 12–18 years by 14% (69). Limited bans of advertising, which include some media but not others (e.g., television but not newspapers), might have little or no effect as the food and beverage industry might redirect its advertising efforts to media not included in the ban, thus limiting researchers' ability to detect causal effects (68).

Suggested measurement

A policy exists that limits advertising and promotion of less healthy foods and beverages, as defined by IOM (11), within local government facilities in a local jurisdiction or on public school campuses during the school day within the largest school district in a local jurisdiction.

This measurement captures policies that prohibit advertising and promotion of less healthy foods and beverages within local government facilities and in schools. Although local government facilities and schools represent only a limited portion of the total advertising landscape, the chosen venue is within the influence of local jurisdictions. This measurement might prompt communities to consider policies that prohibit advertising and promotion of less healthy foods and beverages.

10. Communities Should Discourage Consumption of Sugar-Sweetened Beverages

Overview

Consumption of sugar-sweetened beverages (e.g., carbonated soft drinks, sports drinks, flavored sweetened milk, and fruit drinks) among children and adolescents has increased dramatically since the 1970s and is associated with higher daily caloric intake and greater risk of obesity (70). Although consumption of sugar-sweetened beverages occurs most often in the home, schools and child care centers also contribute to the problem either by serving sugar-sweetened beverages or by allowing children to purchase sugar-sweetened beverages from vending machines (70). Policies that restrict the availability of sugar-sweetened beverages and 100% fruit juice in schools and child care centers might discourage the consumption of high-caloric beverages among children and adolescents.

Evidence

One longitudinal study of a school-based environmental intervention conducted among Native American high school students that combined education to decrease the consumption of sugar-sweetened beverages and increase knowledge of diabetes risk factors with the development of a youth-oriented fitness center demonstrated a substantial reduction in consumption of sugar-sweetened beverages for a 3-year period (71). A randomized control study of a home-based environmental intervention that eliminated sugar-sweetened beverages from the homes

of a diverse group of adolescents demonstrated that, among heavier adolescents, the intervention resulted in significantly ($p = 0.03$) greater reduction in BMI scores compared with the control group (72).

Suggested measurement

Licensed child care facilities within the local jurisdiction are required to ban sugar-sweetened beverages (including flavored/sweetened milk) and limit the portion size of 100% juice.

This measurement captures local and state level policies that aim to limit the availability of sugar-sweetened beverages for young children attending licensed child care facilities. Policies (at either the local or state level) should address both parts of the measurement. Restricting the availability of sugar-sweetened beverages in school settings has been discussed previously (see *Communities Should Restrict Availability of Less Healthy Foods and Beverages in Public Service Venues*).

Strategy to Encourage Breastfeeding

Breastfeeding has been linked to decreased risk of pediatric overweight in multiple epidemiologic studies. Despite this evidence, many mothers never initiate breastfeeding and others discontinue breastfeeding earlier than needed. The following strategy aims to increase overall support for breastfeeding so that mothers are able to initiate and continue optimal breastfeeding practices.

11. Communities Should Increase Support for Breastfeeding

Overview

Exclusive breastfeeding is recommended for the first 4–6 months of life, and breastfeeding together with the age-appropriate introduction of complementary foods is encouraged for the first year of life. Epidemiologic data suggest that breastfeeding provides a limited degree of protection against childhood obesity, although the reasons for this association are not clear (11). Breastfeeding is thought to promote an infant's ability to self regulate energy intake, thereby allowing him or her to eat in response to internal hunger and satiety cues (73). Some research suggests that the metabolic/hormonal cues provided by breastmilk contribute to the protective association between breastfeeding and childhood obesity (74). Despite the many advantages of breastfeeding, many women choose to bottle-feed their babies for a variety of reasons, including social and structural barriers to breastfeeding, such as attitudes and policies regarding breastfeeding in health-care settings and public and work places (75).

Breastfeeding support programs aim to increase the initiation and exclusivity rate of breastfeeding and to extend the duration of breastfeeding. Such programs include a variety of interventions in hospitals and workplaces (e.g., setting up breastfeeding facilities, creating a flexible work environment that allows breastfed infants to be brought to work, providing onsite child care services, and providing paid maternity leaves), and maternity care (e.g., policies and staff training programs that promote early breastfeeding initiation, restricting the availability of supplements or pacifiers, and providing facilities that accommodate mothers and babies). The CDC Guide to Breastfeeding Interventions identifies the following general areas of interventions and programs as effective in supporting breastfeeding: 1) maternity care practices, 2) support for breastfeeding in the workplace, 3) peer support, 4) educating mothers, 5) professional support, and 6) media and community-wide campaigns (76).

Evidence

Evidence directly linking environmental interventions that support breastfeeding with obesity-related outcomes is lacking. However, systematic reviews of epidemiologic studies indicate that breastfeeding helps prevent pediatric obesity: breastfed infants were 13%–22% less likely to be obese than formula-fed infants (77,78), and each additional month of breastfeeding was associated with a 4% decrease in the risk of obesity (79). Furthermore, one study demonstrated that infants fed with low (<20% of feedings from breastmilk) and medium (20%–80% of feedings from breastmilk) breastfeeding intensity were at least twice as likely to have excess weight from 6 to 12 months of infancy compared with infants who were breastfed at high intensity (>80% of feedings from breastmilk) (80).

Systematic reviews indicate that support programs in health-care settings are effective in increasing rates of breastfeeding initiation and in preventing early cessation of breastfeeding. Training medical personnel and lay volunteers to promote breastfeeding decreases the risk for early cessation of breastfeeding by 10% (81) and that education programs increase the likelihood of the initiation of breastfeeding among low-income women in the United States by approximately twofold (75).

One systematic review did not identify any randomized control trials that have tested the effectiveness of workplace-wide interventions promoting breastfeeding among women returning to paid employment (82). However, one study demonstrated that women who directly breastfed their infant at work and/or pumped breast milk at work breastfed at a higher intensity than women who did not breastfeed or pump breast milk at work (83). Furthermore, evaluations of individual interventions aimed at supporting breastfeeding in the work-

place demonstrate increased initiation rates and duration of breastfeeding compared with national averages (76).

Suggested measurement

Local government has a policy requiring local government facilities to provide breastfeeding accommodations for employees that include both time and private space for breastfeeding during working hours.

This measurement captures local policies that support breastfeeding among women who work for local government. Although in most cases infants are not present in the women's place of employment, the policy would require employers to designate time and private space for women to express and store breast milk for later use.

Strategies to Encourage Physical Activity or Limit Sedentary Activity Among Children and Youth

Children spend much of their day in school or child care facilities; therefore, it is important that a portion of their recommended daily physical activity be achieved in these settings. The first three strategies in this section aim for schools to require daily PE classes, engage children in moderate to vigorous physical activity for at least half of the time spent in these classes, and ensure that children are given opportunities for extracurricular physical activity. The final strategy (strategy 15) aims to reduce the amount of time children spend watching televisions and using computers in licensed child care facilities.

12. Communities Should Require Physical Education in Schools

Overview

This strategy supports the Healthy People 2010 objective (objective no. 22.8) to increase the proportion of the nation's public and private schools that require daily PE for all students (15). The National Association for Sport and Physical Education (NASPE) and the American Heart Association (AHA) recommend that all elementary school students should participate in >150 minutes per week of PE and that all middle and high school students should participate in >225 minutes of PE per week for the entire school year (84). School-based PE increases students' level of physical activity and improves physical fitness (23).

Many states mandate some level of PE in schools: 36 states mandate PE for elementary-school students, 33 states mandate PE for middle-school students, and 42 states mandate PE for high-school students (84). However, to what extent

these requirements are enforced is unclear, and only two states (Louisiana and New Jersey) mandate the recommended >150 minutes per week of PE classes. Potential barriers to implementing PE classes in schools include concerns among school administrators that PE classes compete with traditional academic curricula or might detract from students' academic performance. However, a Community Guide review identified no evidence that time spent in PE classes harms academic performance (23).

Evidence

In a systematic review of 14 studies, the Community Guide demonstrated that school-based PE was effective in increasing levels of physical activity and improving physical fitness (23). The review included studies of interventions that increased the amount of time spent in PE classes, the amount of time students are active during PE classes, or the amount of moderate or vigorous physical activity (MVPA) students engage in during PE classes.

Most studies that correlated school-based PE classes and the physical activity and fitness of students focused on the quality and duration of PE classes (e.g., the amount of physical activity during class, the amount of MVPA) rather than simply whether PE was required. However, requiring that PE classes be taught in schools is a necessary minimum condition for measuring the effectiveness of efforts to improve school-based PE class curricula.

Suggested measurement

The largest school district located within the local jurisdiction has a policy that requires a minimum of 150 minutes per week of PE in public elementary schools and a minimum of 225 minutes per week of PE in public middle schools and high schools throughout the school year as recommended by the National Association of Sports and Physical Education in 2006 (86).

This measurement captures whether PE is required in schools, as well as the minimum amount of time required in PE per week by grade level. The measurement specifies distinct standards for elementary and middle/high school levels that are based on NASPE recommendations.

13. Communities Should Increase the Amount of Physical Activity in PE Programs in Schools

Overview

Time spent in PE classes does not necessarily mean that students are physically active during that time. Increasing the amount of physical activity in school-based PE classes has

been demonstrated to be effective in increasing fitness among children. Specifically, increasing the amount of time children are physically active in class, increasing the number of children moving as part of a game or activity (e.g., by modifying game rules so that more students are moving at any given time, or by changing activities to those where all participants stay active), and increasing the amount of moderate to vigorous activity during class time are effective strategies for increasing physical activity.

Evidence

In a review of 14 studies, the Community Guide demonstrated strong evidence of effectiveness for enhancing PE classes taught in school by increasing the amount of time students spend in PE class, the amount of time they are active during PE classes, or the amount of MVPA they engage in during PE classes (23). The median effect of modifying school PE curricula as recommended was an 8% increase in aerobic fitness among school-aged children. Modifying school PE curricula was effective in increasing physical activity across racial, ethnic, and socioeconomic populations, among males and females, in elementary and high schools, and in urban and rural settings.

A quasi-experimental study of the Sports, Play, and Active Recreation for Kids (SPARK) school PE program, which is designed to maximize participation in physical activity during PE classes, demonstrated that the program increased physical activity during PE classes but the effect did not carry over outside of school (85). The study identified no significant effects on fitness levels among boys ($p = 29\text{--}55$), but girls in the classes led by a PE specialist were superior in abdominal and cardio respiratory endurance to girls in the control condition ($p = 0.03$). The Child and Adolescent Trial for Cardiovascular Health (CATCH) is another intervention which aims to increase MVPA in children during PE classes. A randomized, controlled field trial of CATCH that was conducted with more than 5,000 third-grade students from 96 public schools over a 3-year period indicated that the intensity of physical activity in PE classes (class time devoted to MVPA) during the intervention increased significantly in the intervention schools compared with the control schools ($p < 0.02$) (86).

The background and training of teachers who deliver PE curricula might mediate the effect of interventions on physical activity. For example, one study indicated that SPARK classes led by PE specialists spent more time per week in physical activity (40 minutes) than classes led by regular teachers who had received training in the curriculum (33 minutes) (85).

Suggested measurement

The largest school district located within the local jurisdiction has a policy that requires K–12 students to be physically active for at least 50% of time spent in PE classes in public schools.

This measurement assesses whether a school district has a policy that requires at least of 50% of PE classes be devoted to physical activity. The policy needs to apply to all grade levels to meet the measurement criteria.

14. Communities Should Increase Opportunities for Extracurricular Physical Activity

Overview

Opportunities for extracurricular physical activity outside of school hours to complement formal PE increasingly are an important strategy to prevent obesity in children and youth (11). This strategy focuses on noncompetitive physical activity opportunities such as games and dance classes available through community and after-school programs, and excludes participation in varsity team sports or sport clubs, which require tryouts and are not open to all students. Research has demonstrated that after-school programs that provide opportunities for extracurricular physical activity increase children's level of physical activity and improve other obesity-related outcomes.

Evidence

Intervention studies have demonstrated that participation in after-school programs that provided opportunities for extracurricular physical activity held both at schools and other community settings increased participants' level of physical activity (87,88) and improved obesity-related outcomes, such as improved cardiovascular fitness and reduced body fat content (89). Two pilot studies demonstrated that providing opportunities for extracurricular physical activity increased levels of physical activity (90) and decreased sedentary behavior (91) among participants.

The Promoting Life Activity in Youth (PLAY) program is designed to teach active lifestyle habits to children and help them to accumulate 30–60 minutes of moderate to vigorous physical activity per day. One study indicated that participation in PLAY and PE had a significant impact on physical activity among girls ($p < 0.001$) but not for boys (90). Lack of access is a barrier that might limit the impact of increased availability of opportunities for extracurricular physical activity. In East Palo Alto, California, where the city provided buses from schools to the community center, 70% of the eligible girls attended dance classes at least 2 days a week. In Oakland, where the

city did not provide buses, only 33% of eligible girls attended the class two or more times a week (91).

Suggested measurement

The percentage of public schools within the largest school district in a local jurisdiction that allow the use of their athletic facilities by the public during non-school hours on a regular basis.

This measurement captures the percentage of public schools within a community that make their athletic facilities available to the general public during non-school hours. This measurement might prompt communities to open more school athletic facilities to the public.

15. Communities Should Reduce Screen Time in Public Service Venues

Overview

Mechanisms linking extended screen viewing time and obesity include displacement of physical activity; a reduction in metabolic rate and excess energy intake; and increased consumption of food advertised on television as a result of exposure to marketing of high energy dense foods and beverages (92,93). The American Academy of Pediatrics (94) recommends that parents limit children's television time to no more than 2 hours per day. Although only a relatively small portion of television viewing and computer and video game use occurs in public service venues such as schools, day care centers, and after-school programs, local policymakers can intervene to limit screen viewing time among children and youth in these venues.

Evidence

Long-term cohort studies have demonstrated a positive significant ($p = 0.02$) association between television viewing in childhood and body mass index levels in adulthood (92,93). In addition, a cross-sectional study indicated that the amount of time spent watching TV/video was significantly related to overweight among low-income preschool children ($p < 0.004$) (95). A randomized controlled school-based trial indicated that children who reduced their television, videotape, and video game use had significant decreases in BMI ($p = 0.002$), tricep skin fold thickness ($p = 0.002$), and waist circumference ($p < 0.001$) compared with children in control groups (96). The evidence surrounding children's television viewing and its relationship to physical activity has been somewhat inconsistent. A review evaluating correlates of childhood physical activity determined that some studies find time spent engaged in sedentary activities, specifically TV viewing and video use, has a negative association to physical activity, while other stud-

ies find no relationship (97). Multicomponent school-based intervention studies have demonstrated that spending less time watching television is associated with increased physical activity (98) and decreased risk of childhood obesity among girls but not boys (99).

Suggested measurement

Licensed child care facilities within the local jurisdiction are required to limit screen time to no more than 2 hours per day for children aged ≥ 2 years.

This measurement captures the presence of either local- or state-level policies aimed at reducing screen viewing time in child care settings. The screen viewing time limits specified by the measurement are based on the recommendations of the American Academy of Pediatrics. For the purpose of this measurement screen viewing time excludes video games that involve physical activity. Otherwise, determination of what constitutes screen viewing time is left to individual jurisdictions.

Strategies to Create Safe Communities That Support Physical Activity

Certain characteristics of the built environment have been demonstrated to support physical activity. Each of the following eight strategies aims to increase physical activity through changes in the built environment by improving access to places for physical activity such as recreation areas and parks, improving infrastructure to support bicycling and walking, locating schools closer to residential areas to encourage non-motorized travel to and from school, zoning to allow mixed-use areas that combine residential with commercial and institutional uses, improving access to public transportation, and improving personal and traffic safety in areas where persons are or could be physically active.

16. Communities Should Improve Access to Outdoor Recreational Facilities

Overview

Recreation facilities provide space for community members to engage in physical activity and include places such as parks and green space, outdoor sports fields and facilities, walking and biking trails, public pools, and community playgrounds. Accessibility of recreation facilities depends on a number of factors such as proximity to homes or schools, cost, hours of operation, and ease of access. Improving access to recreation facilities and places might increase physical activity among children and adolescents.

Evidence

In a review based on 10 studies, the Community Guide concluded that efforts to increase access to places for physical activity, when combined with informational outreach, can be effective in increasing physical activity (100). The studies reviewed by the Community Guide included interventions such as creating walking trails, building exercise facilities, and providing access to existing facilities. However, it was not possible to separate the benefits of improved access to places for physical activity from health education and services that were provided concurrently (100).

A comprehensive review of 108 studies indicated that access to facilities and programs for recreation near their homes, and time spent outdoors, correlated positively with increased physical activity among children and adolescents (97). A study that analyzed data from a longitudinal survey of 17,766 adolescents indicated that those who used community recreation centers were significantly more likely to engage in moderate to vigorous physical activity ($p \leq 0.00001$) (101).

A multivariate analysis indicated that self-reported access to a park, and the perception that footpaths are safe for walking were significantly associated with adult respondents being classified as physically active at a level sufficient for health benefits (102). Another study that used self-report and GIS data concluded that longer distances and the presence of barriers (e.g., busy streets and steep hills) between individuals and bike paths were associated with non-use of bike paths (103).

Suggested measurement

The percentage of residential parcels within a local jurisdiction located within a half-mile network distance of at least one outdoor public recreational facility.

This measurement captures the percentage of homes within a local jurisdiction that are within walking distance of an outdoor public recreational facility. Recreational facilities are defined as facilities listed in the jurisdiction's inventory with at least one amenity promoting physical activity (e.g., walking/hiking trail, bicycling trail, open play field/play area). For consistency across jurisdictions, the measurement focuses on the entrance points to outdoor recreational facilities, although many recreational facilities have multiple points of entry.

17. Communities Should Enhance Infrastructure Supporting Bicycling

Overview

Enhancing infrastructure supporting bicycling includes creating bike lanes, shared-use paths, and routes on existing and new roads; and providing bike racks in the vicinity of commercial and other public spaces. Improving bicycling infrastructure

can be effective in increasing frequency of cycling for utilitarian purposes (e.g., commuting to work and school, bicycling for errands). Research demonstrates a strong association between bicycling infrastructure and frequency of bicycling.

Evidence

Longitudinal intervention studies have demonstrated that improving bicycling infrastructure is associated with increased frequency of bicycling (104, 105). Cross-sectional studies indicated a significant association between bicycling infrastructure and frequency of biking ($p < 0.001$) (103, 106, 107).

Suggested measurement

Total miles of designated shared-use paths and bike lanes relative to the total street miles (excluding limited access highways) that are maintained by a local jurisdiction.

This measurement captures the availability of shared-use paths and bike lanes, as defined by the American Association of State Highway and Transportation Officials, relative to the total number of street network miles in a community. The numerator of this measurement includes both shared-use paths and bike lanes. The denominator of this measurement is limited to paved streets that are maintained by city/local government, and excludes limited access highways. Although no estimated standard exists for this measurement, data collected from local governments reporting on this measurement can lead to establishment of a standard.

18. Communities Should Enhance Infrastructure Supporting Walking

Overview

Infrastructure that supports walking includes but is not limited to sidewalks, footpaths, walking trails, and pedestrian crossings. Walking is a regular, moderate-intensity physical activity in which relatively large numbers of persons can engage. Well-developed infrastructure supporting walking is an important element of the built environment and has been demonstrated to be associated with physical activity in adults and children. Interventions aimed at supporting infrastructure for walking are included in street-scale urban design and land use interventions that support physical activity in small geographic areas. These interventions can include improved street lighting, infrastructure projects to increase the safety of street crossings, use of traffic calming approaches (e.g., speed humps and traffic circles), and enhancing street landscaping (108).

Evidence

The Community Guide reports sufficient evidence that street-scale urban design and land use policies that support walking are effective in increasing levels of physical activity

(108). Reviews of cross-sectional studies of environmental correlates of physical activity and walking generally find a positive association between infrastructure supportive of walking and physical activity (109,110). However, some systematic reviews indicated no evidence of an association between the presence of sidewalks and physical activity (111). Other reviews indicated associations, but only for certain subgroups of subjects (e.g., men and users of longer walking trails) (108,109). Intervention studies demonstrate effectiveness of enhanced walking infrastructure when combined with other strategies. For example, evaluation of the Marin County Safe Routes to School program indicated that identifying and creating safe routes to school, together with educational components, increased the number of students walking to school (105). When considering the evidence for this strategy, planners should note that physically active individuals might be more likely to locate in communities that have an existing infrastructure for walking, which might produce spurious correlations in cross-sectional studies (109).

Suggested measurement

Total miles of paved sidewalks relative to the total street miles (excluding limited access highways) that are maintained by a local jurisdiction.

This measurement captures the availability of sidewalks in a local jurisdiction relative to the total miles of streets. The measurement does not take into account the continuity of sidewalks between locations. In this measurement total non-highway street miles are limited to paved streets maintained by and paid for by local government and excludes limited access highways. Although no estimated standard exists for this measurement, data collected from local governments reporting on this measurement can lead to establishment of a standard.

19. Communities Should Support Locating Schools within Easy Walking Distance of Residential Areas

Overview

Walking to and from school has been demonstrated to increase physical activity among children during the commute, leading to increased energy expenditure and potentially to reduced obesity. However, the percentage of students walking to school has dropped dramatically over the past 40 years, partially due to the increased distance between children's homes and schools. Current land use trends and policies pose barriers to building smaller schools located near residential areas. Therefore, requisite activities that support locating schools within easy walking distance of residential areas include efforts to change land use and school system policies.

Evidence

The Community Guide indicated that community-scale urban design and land use policies and practices, including locating schools, stores, workplaces, and recreation areas close to residential areas, are effective in facilitating an increase in levels of physical activity (23,108). A simulation modeling study conducted by the U.S. Environmental Protection Agency (EPA) in Florida indicated that school location as well as the quality of the built environment between home and school has an effect on walking and biking to school. Specifically, this combination of school location and built environment quality would produce a 13% increase in nonmotorized travel to school (112). A cross-sectional study in the Philippines indicated that adolescents who walked to school expended significantly more energy than those who used motorized modes of transport. This association was not explainable by in-school or after-school sports or exercise. Assuming no change takes place in energy intake, the difference in energy expenditure between transport modes would lead to an expected 2–3-pound annual weight gain by youth who commute to school by motorized transport (113).

As a result of current land use trends and policies regarding school siting, very little work has been done to locate schools within neighborhoods. A study conducted by the Environmental Protection Agency suggests that the trend of building larger schools with larger catchment areas should be reversed to locate schools within neighborhoods (112). The distance between homes and schools is not the only factor that affects whether children walk to and from school. Among students living within 1 mile of school, the percentage of walkers fell from 90% to 31% between 1969 and 2001 (112). The decrease in walking to and from school has been attributed to a poor walking environment, defined as a built environment that has low population densities, little mixing of land uses, long blocks, and incomplete sidewalks (112). The majority of efforts to encourage walking to and from school involve improving the routes (e.g., Marin County's Safe Routes to School program) rather than improving the location of schools. Previous studies have recommended that local governments and school districts should ensure that children and youth have safe walking and bicycling routes between their homes and schools and encouraged their use (11).

Suggested measurement

The largest school district in the local jurisdiction has a policy that supports locating new schools, and/or repairing or expanding existing schools, within easy walking or biking distance of residential areas.

This measurement captures school district policies that encourage the location of new schools within close proximity of residential neighborhoods and/or to maintain schools that are already located in residential areas. This measurement includes policies that either provide incentives to build or keep schools in residential areas or prevent schools from being built in areas that can only be accessed by motorized vehicles. This measurement might prompt school districts to consider proximity to residential areas when siting schools.

20. Communities Should Improve Access to Public Transportation

Overview

Public transportation includes mass transit systems such as buses, light rail, street cars, commuter trains, and subways, and the infrastructure supporting these systems (e.g., transit stops and dedicated bus lanes). Improving access to public transportation encourages the use of public transit, which might, in turn, increase the level of physical activity when transit users walk or ride bicycles to and from transit access points.

Evidence

The Community Guide identified insufficient evidence to determine the effectiveness of transportation and travel policies and practices in increasing the level of physical activity or improving fitness because only one study of adequate quality was available (108). In a study that analyzed data from the 2001 National Household Travel Survey, researchers indicated that 29% of individuals who walk to and from public transit achieve at least 30 minutes of daily physical activity (114). Another study indicated that access to public transit was associated with decreases in the odds of using automobiles as a preferred mode of transportation and increases in the odds of walking and/or bicycling (115). In a cross-sectional study carried out in four San Francisco neighborhoods, researchers indicated that individuals with easy access to the Bay Area Rapid Transit System (BART) made, on average, 0.66 more nonmotorized trips than those who did not have access to BART (116).

Physically active individuals might be more likely to locate into communities with an infrastructure that supports physical activity, including neighborhoods with infrastructure supporting public transportation (110). Most neighborhood-level cross-sectional studies do not control for individual-level characteristics (e.g., ethnicity, age, socioeconomic status). Environmental factors, including infrastructure for public transit, also might affect different subpopulations differently (110,116).

Suggested measurement

The percentage of residential and commercial parcels in a local jurisdiction that are located either within a quarter-mile network distance of at least one bus stop or within a half-mile network distance of at least one train stop (including commuter and passenger trains, light rail, subways, and street cars).

This measurement captures access to the local public transit system based on the distance persons have to walk to and from bus stops and train stops, either from their homes or from commercial destinations. The measurement should be relatively easy to collect by local jurisdictions that have basic GIS capacity and information about the location of all bus and train stops in their jurisdiction. Using a network distance better represents the actual distances persons must travel on foot or bicycle to reach transit stops.

21. Communities Should Zone for Mixed-Use Development

Overview

Zoning for mixed-use development is one type of community-scale land use policy and practice that allows residential, commercial, institutional, and other public land uses to be located in close proximity to one another. Mixed-use development decreases the distance between destinations (e.g., home and shopping), which has been demonstrated to decrease the number of trips persons make by automobile and increase the number of trips persons make on foot or by bicycle. Zoning regulations that accommodate mixed land use could increase physical activity by encouraging walking and bicycling trips for nonrecreational purposes. Zoning laws restricting the mixing of residential and nonresidential uses and encouraging single-use development can be a barrier to physical activity.

Evidence

The Community Guide lists mixed-use development and diversity of residential and commercial developments as examples of community-scale urban design and land use policies and practices (23). The Community Guide rated the evidence for community-scale urban design and land use policies and practices as sufficient to justify a recommendation that these characteristics increase physical activity (23,108). The recommendation was based on a review of 12 studies in which the median improvement in some aspect of physical activity was 161% (23,108).

Studies using correlation analyses and regression models indicated that mixed land use was associated with increased walking and cycling (110,117–119). A review of quasi-experimental studies indicated residents from high walkability

neighborhoods (defined by higher density, greater connectivity, and more land use mix) reported twice as many walking trips per week than residents from low walkability neighborhoods (defined by low density, poor connectivity, and single land uses) (110). A cross-sectional study conducted in Atlanta, GA indicated that odds of obesity declined as mixed land use increased (118).

Some increased level of physical activity among residents of mixed-use neighborhoods might be attributable to selection of these types of neighborhoods by persons more likely to engage in physical activity (119). Mixed-use development is often combined with multiple design elements from urban planning and policy, including density, connectivity, roadway design, and walkability.

Suggested measurement

Percentage of zoned land area (in acres) within a local jurisdiction that is zoned for mixed use that specifically combines residential land use with one or more commercial, institutional, or other public land uses.

This measurement assesses the proportion of land within a local jurisdiction that is zoned for mixed use including residential land use. Although mixed use does not always require a residential component, for the purpose of this measurement mixed-use development is defined as zoning that combines residential land use with one or more of the following types of land use: commercial, institutional, or other public use.

22. Communities Should Enhance Personal Safety in Areas Where Persons Are or Could Be Physically Active

Overview

Personal safety is affected by crime rates and other nontraffic-related hazards that exist in communities. Limited but supportive evidence indicates that improving community safety might be effective at increasing levels of physical activity in adults and children. In addition, safety considerations affect parents' decisions to allow their children to play and walk outside (11). Interventions to improve safety, such as increasing police presence, decreasing the number of abandoned buildings and homes, and improving street lighting, can be undertaken by individual communities.

Evidence

Cross-sectional studies have demonstrated a negative relationship between crime rates and/or perceived safety and physical activity in neighborhoods, particularly among adolescents (101,120,121). A systematic review indicated that observational measurements of safety (e.g., crime incidence) were negatively associated with physical activity, but subjective

measurements (self-reported safety) were not correlated with physical activity (120).

Few intervention studies have evaluated the impact of policies and practices to improve personal safety on physical activity. However, one study indicated that improved street lighting in London led to reduced crime rates, less fear of crime, and more pedestrian street use (122). Some studies suggest that the relationship between safety and physical activity might vary by gender and/or other individual-level characteristics. For example, one study indicated that incidence rates of violent crimes were associated with lower physical activity in adolescent girls, but not in boys (121).

Persons of lower socioeconomic status depend more on walking as a means of transportation as compared with those of higher socioeconomic status, and they also are more likely to live in neighborhoods that are unsafe (11). This could explain why some studies do not find a positive association between perceived safety and physical activity. Reducing crime levels might require complex, multisectoral, and long-term efforts, which might go beyond the authority and capacity of local communities.

Suggested measurement

The number of vacant or abandoned buildings (residential and commercial) relative to the total number of buildings located within a local jurisdiction.

This measurement captures the percentage of buildings that are vacant or abandoned within a local jurisdiction, which is one of many environmental factors believed to be associated with perceived safety in neighborhoods. When residential or commercial buildings are vacant, places conducive to crime are more readily available, which might deter persons from engaging in physical activity. Vacant or abandoned lots are not intended to be counted for this measure.

23. Communities Should Enhance Traffic Safety in Areas Where Persons Are or Could Be Physically Active

Overview

Traffic safety is the security of pedestrians and bicyclists from motorized traffic. Traffic safety can be enhanced by engineering streets for lower speeds or by retrofitting existing streets with traffic calming measurements (e.g., speed tables and traffic circles). Traffic safety can also be enhanced by developing infrastructure to improve the safety of street crossings (e.g., raised crosswalks and textured pavement) for nonmotorized traffic and for pedestrians.

The lack of safe places to walk, run, and bicycle as a result of real or perceived traffic hazards can deter children and adults from being physically active. Enhancing traffic safety has been

demonstrated to be effective in increasing levels of physical activity in adults and children. Research suggests that persons living in neighborhoods with higher traffic safety are more physically active.

Evidence

The Community Guide reviewed both community-scale and street-scale urban design and land use policies and practices, including interventions aimed at improving traffic safety. The review indicated that both community-scale and street-scale policies and practices were effective in increasing physical activity (108). On the basis of sufficient evidence of effectiveness, the Community Guide recommends implementing community-scale and street-scale urban design and land use policies to promote physical activity, including design components to improve street lighting, infrastructure projects to increase safety of pedestrian street crossings, and use of traffic calming approaches such as speed humps and traffic circles (23).

A review of 19 studies examined the effects of environmental factors on physical activity, five of which considered traffic safety (123). One study demonstrated significant effects of traffic safety on increased physical activity (102).

Suggested measurement

Local government has a policy for designing and operating streets with safe access for all users which includes at least one element suggested by the National Complete Streets Coalition (<http://www.completestreets.org>).

This measurement assesses whether a community has a policy for all-user street design, such as the Complete Streets program. Specific elements of the measurement are based on Complete Streets policy. To meet criteria for this measurement, local governments must incorporate at least one of the following elements in a local policy to enhance traffic safety for pedestrians:

- specifies that “all users” includes pedestrians, bicyclists, transit vehicles and users, and motorists of all ages and abilities;
- aims to create a comprehensive, integrated, connected network;
- recognizes the need for flexibility: that all streets are different and user needs will be balanced;
- is adoptable by all agencies to cover all roads;
- applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way;
- makes any exceptions specific and sets a clear procedure that requires high-level approval of exceptions;
- directs the use of the latest and best design standards;

- directs that Complete Streets solutions fit within the context of the community; and
- establishes performance standards with measurable outcomes.

Strategy to Encourage Communities to Organize for Change

Community coalitions and partnerships are a way for government agencies, private sector institutions, community groups, and individual citizens to come together for the common purpose of preventing obesity by improving nutrition and physical activity. The following strategy calls for local governments to participate in community coalitions or partnerships to address obesity.

24. Communities Should Participate in Community Coalitions or Partnerships to Address Obesity

Overview

Community coalitions consist of public- and private-sector organizations that, together with individual citizens, work to achieve a shared goal through the coordinated use of resources, leadership, and action (11). Potential stakeholders in community coalitions aimed at obesity prevention include but are not limited to community organizations and leaders, health-care professionals, local and state public health agencies, industries (e.g., building and construction, restaurant, food and beverage, and entertainment), the media, educational institutions, government (including transportation and parks and recreation departments), youth-related and faith-based organizations, nonprofit organizations and foundations, and employers.

The effectiveness of community coalitions stems from the multiple perspectives, talents, and expertise that are brought together to work toward a common goal. In addition, coalitions build a sense of community, enhance residents’ engagement in community life, and provide a vehicle for community empowerment. Research in tobacco control demonstrates that the presence of antismoking community coalitions is associated with lower rates of cigarette use. Based on this research, it is plausible that community coalitions might be effective in preventing obesity and in improving physical activity and nutrition.

Evidence

Little evidence is available to determine the impact of community coalitions on obesity prevention (11). However, tobacco-control literature demonstrates that the presence of antismoking community coalitions is associated with lower rates of tobacco consumption. One study indicated that states

with a greater number of anti-tobacco coalitions had lower per capita cigarette consumption than states with a lower number of coalitions (124).

Suggested measurement

Local government is an active member of at least one coalition or partnership that aims for environmental and policy change to promote active living and/or healthy eating (excluding personal health programs such as health fairs).

This measurement captures whether local governments participate in an active coalition that addresses active living and/or healthy eating within a local jurisdiction. Local government's participation can be based on a written agreement but can also include informal involvement in a community coalition. Coalitions should aim to address environmental and/or policy-level change for obesity prevention to meet the measurement criteria. Coalitions that only focus on awareness and/or individual level services are not included in this measure.

Limitations

The recommended strategies and corresponding suggested measurements provided in this report are subject to at least seven limitations.

First, the 24 recommended community strategies are based on available evidence, expert opinion and transparent documentation; however, the suggested measurements have not been validated in practice. These measurements represent a first step that communities can use to assess local-level policies and environments that support healthy eating and active living. In addition, for a few of the recommended strategies, no evidence of an obesity-related health outcome exists. These recommendations were included on the basis of expert opinion that supported their inclusion to determine the effectiveness of the strategy for preventing obesity.

Second, to allow local governments to collect data, the suggested measurements typically assess only one aspect or dimension of a more complex environmental or policy strategy for preventing obesity. Although single indicators usually are inadequate for achieving in-depth community-wide assessment of complex strategies, they can be appropriate tools to assess local government's attention and focus on efforts to create an environment in which healthy eating and active living are supported.

Third, by design, the proposed measurements are confined to public settings that are under the authority of local governments and public schools. Although private settings are critical to the overall aim of preventing obesity, they are not addressed by this project because they are not under the authority of local

jurisdictions. However, these obesity prevention strategies and their corresponding suggested measurements could be adapted to other settings throughout the community, outside the purview of local governments. In addition, all of the measurements pertaining to schools are limited to the largest school district within a local jurisdiction to ease the burden for data collection for jurisdictions that contain many school districts.

Fourth, many of the recommended strategies and suggested measurements might have more relevance to urban and suburban communities than to rural communities that typically have limited transit systems, sidewalk networks, and/or local government facilities. Many of the measurements require GIS capability; this technology might not yet be available in certain rural communities. However, this limitation will likely be temporary because of the rapid acquisition and implementation of GIS capability by local governments.

Fifth, certain of the suggested measurements require specific quantitation (e.g., the number of full-service grocery stores per 10,000 residents). Currently, no established standards exist by which communities can assess and compare their performance on a particular measure; data collected from local governments reporting on these measurements can lead to the emergence of a recommended standard.

Sixth, many of the proposed policy-level measurements have their own limitations. For example, although the measurements have been developed in consideration of local governments, a number of policies might be established at the state level, which would limit local variability within states. To assist in expanding our understanding of each policy, the measurement collection protocol recommends recording the key components of each policy, the date of enactment, and whether it is an institutional-, local-, or state-level policy. The measurements are designed to capture state and county policies that impact nutrition and physical activity environments at the local level.

Finally, certain policy measurements might not be highly sensitive to change from one year to the next. For example, after a community has a desired policy in place, several years might elapse before any verifiable change can be detected, quantified, and reported. Knowing that a policy exists does not reveal the extent to which that policy actually is implemented or enforced, if at all. Although implementation of and adherence to policies are critical to their impact, measuring the implementation of policies requires a level of assessment that might not be generally feasible for most local governments. Despite these limitations, drawing the attention of elected officials and government staffs to the existence of a policy serves as a catalyst for discussion and consideration with community members.

Next Steps

The next step for this project is to disseminate the recommended community strategies and suggested measurements for use by local governments and communities throughout the United States. To help accomplish this, an implementation and measurement guide will be published and made available through the CDC website (available at <http://www.cdc.gov/nccdphp/dnpao/publications/index.html>). In addition, the measurements will be integrated into a new survey module that will be available to all members of ICMA's Center for Performance Measurement. Dissemination of these recommended obesity prevention strategies and proposed measurements is intended to inspire communities to consider implementing new policy and environmental change initiatives aimed at reversing the obesity epidemic. The recommended strategies and suggested measurements outlined in this report are being pilot tested in the Minnesota and Massachusetts state surveillance systems (Laura Hutton, MA, Minnesota Department of Health, personal communication, 2009; Maya Mohan, MPH, Massachusetts Department of Health, personal communication, 2009).

Acknowledgments

The membership lists of the multiple subgroups that participated in the Measurements Project are listed on the inside back cover of this report. In addition, the following persons and organizations also contributed to this report: the International City/County Management Association; John Moore, PhD, CDC Foundation; Diane Dunet, PhD; Deborah Galuska, PhD, Division of Nutrition, Physical Activity, and Obesity, CDC. Support to the CDC Foundation was provided by the Robert Wood Johnson Foundation, the W.K. Kellogg Foundation, and Kaiser Permanente.

References

- Ogden CL, Carroll MD, Curtin LR, et al. Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA* 2006;295:1549–55.
- Ogden CL, Carroll MD, Flegal KM. High body mass index for age among U.S. children and adolescents, 2003–2006. *JAMA* 2008;299:2401–5.
- Ogden CL, Carroll MD, McDowell MA, Flegal KM. Obesity among adults in the United States: no change since 2003–2004. Bethesda, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2007.
- CDC. Prevalence of overweight, obesity, and extreme obesity among adults: United States, Trends 1976–80 through 2005–2006. Hyattsville, MD: US Department of Health and Human Services, National Center for Health Statistics, CDC; 2008.
- Hill JO, Peters JC. Environmental contributions to the obesity epidemic. *Science* 1998;280:1371–4.
- Sallis JF, Glanz K. The role of built environments in physical activity, eating, and obesity in childhood. *Future Child* 2006;16:89–108.
- Sallis JF, Glanz K. Physical activity and food environments: solutions to the obesity epidemic. *The Millbank Quarterly* 2009;87:123–54.
- McCann B. Community design for healthy eating: how land use and transportation solutions can help. Princeton, NJ: Robert Wood Johnson Foundation; 2006.
- Joint Center for Political and Economic Studies and PolicyLink. A place for healthier living: improving access to physical activity and healthy foods. Washington, DC: Joint Center for Political and Economic Studies; 2004.
- Ewing R, Schmid RL, Killingsworth, R, et al. Relationship between urban sprawl and physical activity, obesity, and morbidity. *American Journal of Health Promotion* 2003;18:47–57.
- Institute of Medicine. Preventing childhood obesity: health in the balance. Washington, DC: The National Academies Press; 2005.
- Institute of Medicine. Progress in preventing childhood obesity: How do we measure up? Washington, DC: The National Academies Press; 2007.
- The Keystone Center. The Keystone forum on away-from-home foods: opportunities for preventing weight gain and obesity: final report 2006. Keystone, CO; The Keystone Center; 2006.
- Papas MA, Alberg AJ, Ewing R, et al. The built environment and obesity. *Epidemiol Rev* 2007;29:129–43.
- US Department of Health and Human Services. Healthy people 2010: understanding and improving health. 2nd ed. Washington, DC: US Department of Health and Human Services; 2000. Available at <http://www.health.gov/healthypeople>.
- CDC. Developing recommendations for future national diabetes objectives. Atlanta, GA: US Department of Health and Human Services, CDC; 2007.
- Doll R, Hill A. Mortality in relation to smoking: ten years' observations of British doctors. *British Medical Journal* 1964;35:1399–410.
- Glasgow R, Vogt T, Boles S. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999;89:1322–7.
- Sanders JM. The program evaluation standards: how to assess evaluations of educational programs. Thousand Oaks, CA: Sage Publications, Inc.; 1994.
- Starr G, Rogers T, Schooley M, et al. Key outcome indicators for evaluating comprehensive tobacco control programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2005.
- US Department of Health and Human Services. Health consequences of smoking, 2004: 28th report of the Surgeon General. Washington, DC: US Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2004.
- Brownson RC, Haire-Joshu D, Luke DA. Shaping the context of health: a review of environmental and policy approaches in the prevention of chronic diseases. *Annu Rev Public Health* 2006;27:341–70.
- CDC. The guide to community preventive services: what works to promote health? New York, NY: Oxford University Press; 2005.
- Faith MS, Fontaine KR, Baskin ML, Allison DB. Toward the reduction of population obesity: macrolevel environmental approaches to the problems of food, eating, and obesity. *Psychol Bull* 2007;133:205–26.
- Jago R, Baranowski T, Baranowski JC. Fruit and vegetable availability: a micro environmental mediating variable? *Public Health Nutr* 2007;10:681–9.
- French SA, Story M, Fulkesron JA, Hannan P. An environmental intervention to promote lower-fat food choices in secondary schools: outcomes of the TACOS Study. *Am J Public Health* 2004;94:1507–12.
- US Department of Health and Human Services, US Department of Agriculture. Dietary guidelines for Americans. 6th ed. Washington, DC: U.S. Government Printing Office; 2005.

28. Drewnowski A. Obesity and the food environment: dietary energy density and diet costs. *Am J Prev Med* 2004;27(Suppl):154–62.
29. French SA, Story M, Jeffery RW. Environmental influences on eating and physical activity. *Annu Rev Public Health* 2001;22:309–35.
30. Seymour JD, Yaroch AL, Serdula M, et al. Impact of nutrition environmental interventions on point-of-purchase behavior in adults: a review. *Prev Med* 2004;39(Suppl 2):S108–36.
31. French SA, Story M, Jeffery RW, et al. Pricing strategy to promote fruit and vegetable purchase in high school cafeterias. *J Am Diet Assoc* 1997;97:1008–10.
32. French SA, Jeffery RW, Story M, et al. Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study. *Am J Public Health* 2001;91:112–7.
33. French SA, Jeffery RW, Story M, et al. A pricing strategy to promote low-fat snack choices through vending machines. *Am J Public Health* 1997;87:849–51.
34. Dong D, Lin B. Fruit and vegetable consumption by low-income Americans: would a price reduction make a difference?. Washington, DC: US Department of Agriculture, Economic Research Service; 2009.
35. Anderson JV, Bybee DI, Brown RM, et al. Five a day fruit and vegetable intervention improves consumption in a low income population. *J Am Diet Assoc* 2001;101:195–202.
36. Cincirpini P. Changing food selections in a public cafeteria: an applied behavioral analysis. *Behavioral Modification* 1984;8:520–39.
37. Jeffery RW, French SA, Raether C, Baxter JE. An environmental intervention to increase fruit and salad purchases in a cafeteria. *Prev Med* 1994;23:788–92.
38. Herman DR, Harrison GG, Afifi AA, Jenks E. Effect of a targeted subsidy on intake of fruits and vegetables among low-income women in the Special Supplemental Nutrition Program for Women, Infants, and Children. *Am J Public Health* 2008;98:98–105.
39. Larson NI, Story MT, Nelson MC. Neighborhood environments: disparities in access to healthy foods in the U.S. *Am J Prev Med* 2008;36:74–81.
40. Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *Am J Prev Med* 2002;22:23–9.
41. Morland K, Wing S, Diez Roux A. The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study. *Am J Public Health* 2002;92:1761–7.
42. The Reinvestment Fund. The economic impacts of supermarkets on their surrounding communities. Philadelphia, PA: The Reinvestment Fund; nd.
43. Powell LM, Auld MC, Chaloupka FJ, et al. Associations between access to food stores and adolescent body mass index. *Am J Prev Med* 2007;33(Suppl):S301–7.
44. US Department of the Treasury. Community development financial institution financing of supermarkets in underserved communities: a case study. Washington, DC: US Department of the Treasury; 2008.
45. Zenk SN, Schulz AJ, Hollis-Neely T, et al. Fruit and vegetable intake in African Americans' income and store characteristics. *Am J Prev Med* 2005;29:1–9.
46. Kunkel ME, Luccia B, Moore AC. Evaluation of the South Carolina seniors farmers' market nutrition education program. *J Am Diet Assoc* 2003;103:880–3.
47. Conrey EJ, Frongillo EA, Dollahite JS, Griffin MR, et al. Integrated program enhancements increased utilization of Farmers' Market Nutrition Program. *J Nutr* 2003;133:1841–4.
48. Mascarenhas M, Gottlieb R. The farmers market salad bar: assessing the first three years of the Santa Monica–Malibu Unified School District Program. Occidental, CA: Community Food Security Project Urban and Environmental Policy Institute, Occidental College; 2008:1–24.
49. Buzby JC, Wells HF, Vocke G. Possible implications for U.S. agriculture from adoption of select dietary guidelines. Washington, DC: US Department of Agriculture; 2006.
50. Feenstra GW. Local food systems and sustainable communities. *American Journal of Alternative Agriculture* 1997;12:28–36.
51. Conner DS, Knudson WA, Hamm MW, Peterson HC. The food system as an economic driver: strategies and applications for Michigan. *Journal of Hunger and Environmental Nutrition* 2008;3:371–83.
52. Swenson D. The economic impact of increased fruit and vegetable production and consumption in Iowa: phase II. Ames, IA: Leopold Center for Sustainable Agriculture; 2006.
53. Hamm MW. Linking sustainable agriculture and public health: opportunities for realizing multiple goals. *Journal of Hunger and Environmental Nutrition*. In press.
54. Delva J, O'Malley PM, Johnston LD. Availability of more-healthy and less-healthy food choices in American schools: a national study of grade, racial/ethnic, and socioeconomic differences. *Am J Prev Med* 2007;33(4 Suppl):S226–39.
55. Kubik MY, Lytle LA, Hannan PJ, et al. The association of the school food environment with dietary behaviors of young adolescents. *Am J Public Health* 2003;93:1168–73.
56. Government Accounting Office. School meal programs: competitive foods are available in many schools: actions taken to restrict them differ by state and locality. Washington, DC: Government Accounting Office; 2004.
57. CDC. Do increased portion sizes affect how much we eat? Atlanta, GA: US Department of Health and Human Services, CDC; 2006.
58. Kral TV, Rolls BJ. Energy density and portion size: their independent and combined effects on energy intake. *Physiol Behav* 2004;82:131–8.
59. Rolls BJ, Roe LS, Meengs JS. Reductions in portion size and energy density of foods are additive and lead to sustained decreases in energy intake. *Am J Clin Nutr* 2006;83:11–7.
60. Rolls BJ, Roe LS, Meengs JS, Wall DE. Increasing the portion size of a sandwich increases energy intake. *J Am Diet Assoc* 2004;104:367–72.
61. Diliberti N, Bordi PL, Conklin MT, et al. Increased portion size leads to increased energy intake in a restaurant meal. *Obes Res* 2004;12:562–8.
62. Wansink B, Park SB. At the movies: how external cues and perceived taste impact consumption volume. *Food Quality and Preference* 2001;12:69–74.
63. Pratt CA, Lemon SC, Fernandez ID, et al. Design characteristics of worksite environmental interventions for obesity prevention. *Obesity* 2007;15:2171–80.
64. Federal Trade Commission. Marketing food to children and adolescents: a review of industry expenditures, activities, and self-regulation. Washington, DC: Federal Trade Commission; 2008.
65. Institute of Medicine. Food marketing to children and youth: threat or opportunity? Washington, DC: The National Academies Press; 2006.
66. Ashe M, Feldstein LM, Graff S, et al. Local venues for change: legal strategies for healthy environments. *J Law Med Ethics* 2007;35:138–47.
67. Hill JO, Peters JC, Wyatt HR. The role of public policy in treating the epidemic of global obesity. *Clin Pharmacol Ther* 2007;81:772–5.

68. Saffer H, Chaloupka F. The effect of tobacco advertising bans on tobacco consumption. *J Health Econ* 2000;19:1117–37.
69. Shin-Yi C, Inas R, Michael G. Fast-food restaurant advertising on television and its influence on childhood obesity. *The Journal of Law and Economics* 2008;51:599–618.
70. CDC. Does drinking beverages with added sugars increase the risk of overweight? Atlanta, GA: US Department of Health and Human Services, CDC; 2006.
71. Ritenbaugh C, Teufel-Shone NI, Aickin MG, et al. A lifestyle intervention improves plasma insulin levels among Native American high school youth. *Prev Med* 2003;36:309–19.
72. Ebbeling CB, Feldman HA, Osganian SK, et al. Effects of decreasing sugar-sweetened beverage consumption on body weight in adolescents: a randomized, controlled pilot study. *Pediatrics* 2006;117:673–80.
73. Fisher JO, Birch LL, Smiciklas-Wright H, Picciano MF. Breast-feeding through the first year predicts maternal control in feeding and subsequent toddler energy intakes. *J Am Diet Assoc* 2000;100:641–6.
74. Dewey KG. Is breastfeeding protective against child obesity? *J Hum Lact* 2003;19:9–18.
75. Dyson L, McCormick F, Renfrew MJ. Interventions for promoting the initiation of breastfeeding. *Cochrane Database Syst Rev* 2005;(2):CD001688.
76. Shealy KR, Li R, Benton-Davis S, Grummer-Strawn L. The CDC guide to breastfeeding interventions. Atlanta, GA: US Department of Health and Human Services, CDC; 2005.
77. Arenz S, Ruckerl R, Koletzko B, vonKries R. Breast-feeding and childhood obesity: a systematic review. *Int J Obes Relat Metab Disord* 2004;28:1247–56.
78. Owen CG, Martin RM, Whincup PH, et al. Effect of infant feeding on the risk of obesity across the life course: a quantitative review of published evidence. *Pediatrics* 2005;115:1367–77.
79. Harder T, Bergmann R, Kallischnigg G, Plogemann A. Duration of breastfeeding and risk of overweight: a meta-analysis. *Am J Epidemiol* 2005;162:397–403.
80. Li R, Fein SB, Grummer-Strawn LM. Association of breastfeeding intensity and bottle-emptying behaviors at early infancy with infants' risk for excess weight at late infancy. *Pediatrics* 2008;122(Suppl 2):S77–84.
81. Britton C, McCormick FM, Renfrew MJ, et al. Support for breastfeeding mothers. *Cochrane Database Syst Rev* 2007;(1):CD001141.
82. Abdulwadud OA, Snow ME. Interventions in the workplace to support breastfeeding for women in employment. *Cochrane Database Syst Rev* 2007;(3):CD006177.
83. Fein SB, Mandal B, Roe BE. Success of strategies for combining employment and breastfeeding. *Pediatrics* 2008;122(Suppl 2):S56–62.
84. National Association for Sport and Physical Education and American Health Association. Shape of the nation report: status of physical education in the USA. Reston, VA: National Association for Sport and Physical Education; 2006.
85. Sallis JF, McKenzie TL, Alcaraz JE, et al. The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *Am J Public Health* 1997;87:1328–34.
86. Luepker RV, Perry CL, McKinlay SM, et al. Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health. CATCH collaborative group. *JAMA* 1996;75:768–76.
87. Engels HJ, Gretebeck RJ, Gretebeck KA, Jimenez L. Promoting healthful diets and exercise: efficacy of a 12-week after-school program in urban African Americans. *J Am Diet Assoc* 2005;105:455–9.
88. Kelder S, Hoelscher DM, Barroso CS, et al. The CATCH Kids Club: a pilot after-school study for improving elementary students' nutrition and physical activity. *Public Health Nutr* 2005;8:133–40.
89. Yin Z, Moore JB, Johnson MH, et al. The Medical College of Georgia Fitkid project: the relations between program attendance and changes in outcomes in year 1. *Int J Obes (Lond)* 2005;29(Suppl 2):S40–5.
90. Pangrazi RP, Beighle A, Vehige T, Vack C. Impact of Promoting Lifestyle Activity for Youth (PLAY) on children's physical activity. *J Sch Health* 2003;73:317–21.
91. Robinson TN, Killen JD, Kraemer HD, et al. Dance and reducing television viewing to prevent weight gain in African-American girls: the Stanford GEMS pilot study. *Ethn Dis* 2003;13(Suppl 1):S65–77.
92. Hancox RJ, Milne BJ, Poulton R. Association between child and adolescent television viewing and adult health: a longitudinal birth cohort study. *Lancet* 2004;364(9430):257–62.
93. Viner RM, Cole TJ. Television viewing in early childhood predicts adult body mass index. *J Pediatr* 2005;147:429–35.
94. American Academy of Pediatrics. Children, adolescents, and television. *Pediatrics* 2001;107:423–6.
95. Dennison BA, Erb TA, Jenkins PL. Television viewing and television in bedroom associated with overweight risk among low-income preschool children. *Pediatrics* 2002;109:1028–35.
96. Robinson TN. Reducing children's television viewing to prevent obesity: a randomized controlled trial. *JAMA* 1999;282:1561–7.
97. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Med Sci Sports Exerc* 2000;32:963–75.
98. Mueller M, Asbeck I, Mast M, et al. Prevention of obesity; more than an intention. Concept and first results of the Kiel Obesity Prevention Study (KOPS). *International Journal of Obesity* 2001;25(Suppl 1):S66–74.
99. Gortmaker SL, Peterson K, Wiecha J, et al. Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Arch Pediatr Adolesc Med* 1999;153:409–18.
100. Kahn EB, Ramsey LT, Brownson RC, et al. The effectiveness of interventions to increase physical activity. A systematic review. *Am J Prev Med* 2002;22(4 Suppl):73–107.
101. Gordon-Larsen P, McMurray RG, Popkin BM. Determinants of adolescent physical activity and inactivity patterns. *Pediatrics* 2000;105:E83.
102. Booth ML, Owen N, Bauman A, et al. Social-cognitive and perceived environmental influences associated with physical activity in older Australians. *Prev Med* 2000;31:15–22.
103. Troped PJ, Saunders RP, Pate RR, et al. Associations between self-reported and objective physical environmental factors and use of a community rail-trail. *Prev Med* 2001;32:191–200.
104. Macbeth AG. Bicycle lanes in Toronto. *ITE Journal* 1999;69:38–46.
105. Staunton CE, Hubsmith D, Kallins W. Promoting safe walking and biking to school: the Marin County success story. *Am J Public Health* 2003;93:1431–4.
106. Dill J, Carr T. Bicycle commuting and facilities in major U.S. cities: if you build them, commuters will use them. *Transportation Research Record* 2003;1829:116–23.
107. Nelson A, Allen D. If you build them, commuters will use them: association between bicycle facilities and bicycle commuting. *Transportation Research Record* 1997;1578:79–83.

108. Heath GW, Brownson RC, Kruger J, et al. The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical and Activity and Health* 2006;3 (Suppl 1):S55–76.
109. Owen N, Humpel N, Leslie E, et al. Understanding environmental influences on walking: review and research agenda. *Am J Prev Med* 2004;27:67–76.
110. Saelens BE, Sallis JF, Frank LD. Environmental correlates of walking and cycling: findings from the transportation, urban design, and planning literatures. *Ann Behav Med* 2003;25:80–91.
111. Humpel N, Owen N, Leslie E. Environmental factors associated with adults' participation in physical activity: a review. *Am J Prev Med* 2002;22:188–99.
112. Environmental Protection Agency. EPA 231-R-03-004. Travel and environmental implications of school siting. Washington, DC: Environmental Protection Agency; 2003.
113. Tudor-Locke C, Ainsworth BE, Adair LS, Popkin BM. Objective physical activity of filipino youth stratified for commuting mode to school. *Med Sci Sports Exerc* 2003;35:465–71.
114. Besser LM, Dannenberg AL. Walking to public transit: steps to help meet physical activity recommendations. *Am J Prev Med* 2005;29:273–80.
115. Certero R. Mixed land-uses and commuting: evidence from the American Housing Survey. *Transportation Research Part A: Policy & Practice* 1996;30:361–77.
116. Kitamura R, Mokhtarian P, Laidet L. A micro-analysis of land use and travel in five neighborhoods in the San Francisco Bay Area. *Transportation Research Record* 1997;24:125–58.
117. Saelens BE, Sallis JF, Black JB, Chen D. Neighborhood-based differences in physical activity: an environment scale evaluation. *Am J Public Health* 2003;93:1552–8.
118. Frank LD, Andresen MA, Schmid TL. Obesity relationships with community design, physical activity, and time spent in cars. *Am J Prev Med* 2004;27:87–96.
119. Frank LD, Schmid TL, Sallis JF, et al. Linking objectively measured physical activity with objectively measured urban form: findings from SMARTRAQ. *Am J Prev Med* 2005;28(Suppl 2):117–25.
120. Ferreira I, van der Horst K, Wendel-Vos W, et al. Environmental correlates of physical activity in youth - a review and update. *Obes Rev* 2007;8:129–54.
121. Gomez JE, Johnson BA, Selva M, Sallis JF. Violent crime and outdoor physical activity among inner-city youth. *Prev Med* 2004;39:876–81.
122. Painter K. The influence of street lighting improvements on crime, fear and pedestrian street use, after dark. *Landscape and Urban Planning* 1996;35:193.
123. Humpel N, Owen N, Leslie E, et al. Associations of location and perceived environmental attributes with walking in neighborhoods. *Am J Health Promot* 2004;18:239–42.
124. Stillman FA, Hartman AM, Graubard BI, et al. Evaluation of the American Stop Smoking Intervention Study (ASSIST): a report of outcomes. *J Natl Cancer Inst* 2003;95:1681–91.

Appendix

Terms Used in This Report

Bike lanes: As defined by the American Association of State Highway and Transportation Officials (AASHTO), portions of a roadway that have been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.

Bike routes: Cycling routes on roads shared with motorized vehicles or on specially marked sidewalks.

Coalition: A group of persons representing diverse public- or private-sector organizations or constituencies working together to achieve a shared goal through coordinated use of resources, leadership, and action.

Competitive foods and beverages: All foods and beverages served or sold in schools that are not part of federal school meal programs, including “à la carte” items sold in cafeterias and items sold in vending machines. As defined by the Institute of Medicine (IOM), competitive foods and beverages typically are lower in nutritional quality than those offered by school meal programs (1).

Complete streets: As defined by the National Complete Streets Coalition (<http://www.completestreets.org>), streets that are designed and operated to enable safe access along and across the street for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.

Construct validity: The accuracy of a measurement tool that is established by demonstrating its ability to identify or measure the variables or constructs that it intends to identify or measure.

Eating occasion: A single meal or snack.

Energy density: The number of calories per gram in weight.

Environmental Change: An alteration or change to physical, social, or economic environments designed to influence people’s practices and behaviors.

Farm stand: Multiple and single vendors that are not part of a licensed farmers’ market.

Farmer-day: Any part of a calendar day spent by a farmer (vendor) at a farmers’ market (excluding craft vendors and prepared food vendors). The total number of annual farmer-days for a given farmers’ market is based on the number of days that the farmers’ market is open in a year multiplied by the number of farm vendors at the market on a given day.

Full-service grocery store: A medium to large food retail store that sells a variety of food products, including some perishable items and general merchandise.

Healthier foods and beverages: As defined by IOM, foods and beverages with low energy density and low content of calories, sugar, fat, and sodium (1).

Largest school district within a local jurisdiction: The school district that serves the largest number of students within a local jurisdiction.

Less healthy foods and beverages: As defined by IOM, foods and beverages with a high content of calories, sugar, fat, and sodium, and low content of nutrients, including protein, vitamins A and C, niacin, riboflavin, thiamin, calcium, and iron (1).

Local government facilities: Facilities owned, leased, or operated by a local government (including facilities that might be owned or leased by a local government but operated by contracted employees). For the purposes of this project, and according to the definition established by ICMA, local government facilities might include facilities in the following categories:

- **24-hour “dormitory-type” facilities:** facilities that generally are in operation 24 hours per day, 7 days per week, such as firehouses (and their equipment bays), women’s shelters, men’s shelters, and group housing facilities for children, seniors, and physically or mentally challenged persons, not including regular public housing;
- **administrative/office facilities:** general office buildings, court buildings, data processing facilities, sheriff’s offices (including detention facilities), 911 centers, social service intake centers, day care/preschool facilities, historical buildings, and other related facilities;
- **detention facilities:** jails, adult detention centers, juvenile detention centers, and related facilities;
- **health care facilities:** hospitals, clinics, morgues, and related facilities;
- **recreation/community center facilities:** senior centers, community centers, gymnasiums, public parks and fields, and other similar recreation centers, including concession stands located at these facilities; and
- **other facilities:** water treatment plants, airports, schools, and all other facilities that do not explicitly fall into the categories listed above.

Low energy dense foods and beverages: Foods and beverages with a low calorie-per-gram ratio. Foods with a high water and fiber content are low in energy density, such as fruits, vegetables, and broth-based soups and stews.

Maternity care practices (related to breastfeeding): Practices that take place during the intrapartum hospital stay, including prenatal care, care during labor and birthing, and postpartum care. Maternity care practices supporting breastfeeding might include developing a

written policy on breastfeeding, providing all staff with breastfeeding education and training, encouraging early breastfeeding initiation, supporting cue-based feeding, restricting supplements and pacifiers for breastfed infants, and providing for post-discharge follow-up.

Measure: For the purposes of this project a measure is defined as a single data element that can be collected through an objective assessment of the physical or policy environment and used to quantify an obesity prevention strategy.

Mixed-use development: Zoning that combines residential land use with one or more of the following types of land use: commercial, industrial, or other public use.

Network distance: Shortest distance between two locations by way of the public street network.

Nonmotorized transportation: Any form of transportation that does not involve the use of a motorized vehicle such as walking and biking.

Nutrition standards: Criteria that determine which foods and beverages may be offered in a particular setting (e.g., schools or local government facilities). Nutrition standards may be defined locally or adopted from national standards.

Partnership: A business-like arrangement that might involve two or more partner organizations.

Policy: Laws, regulations, rules, protocols, and procedures, designed to guide or influence behavior. Policies can be either legislative or organizational in nature.

Portion size: Amount of a single food item served in a single eating occasion (e.g., a meal or a snack). Portion size is the amount (e.g., weight, calorie content, or volume) of food offered to a person in a restaurant, the amount in the packaging of prepared foods, or the amount a person chooses to put on his or her plate. One portion of food might contain several USDA food servings.

Pricing strategies: Intentional adjustment to the unit cost of an item (e.g., offering a discount on a food item, selling a food item at a lower profit margin, or banning a surcharge on a food item).

Public recreation facility: Facility listed in the local jurisdiction's facility inventory that has at least one amenity that promotes physical activity (e.g., walking/hiking trail, bicycle trail, or open play field/play area).

Public recreation facility entrance: The point of entry to a facility that permits recreation. For the purposes of this project, geographic information system (GIS) coordinates of the entrance to a recreational facility or the street address of the facility.

Public service venue: Facilities and settings open to the public that are managed under the authority of government entities (e.g., schools, child care centers, community recreational facilities, city and county buildings, prisons, and juvenile detention centers).

Public transit stops: Points of entrance to a local jurisdiction's transportation and public street network, such as bus stops, light rail stops, and subway stations.

School siting: The locating of schools and school facilities.

Screen (viewing) time: Time spent watching television, playing video games, and engaging in noneducational computer activities.

Shared-use paths: As defined by AASHTO, bikeways used by cyclists, pedestrians, skaters, wheelchair users, joggers, and other non-motorized users that are physically separated from motorized vehicular traffic by an open space or barrier and within either the highway right-of-way or an independent right-of-way.

Sidewalk network: An interconnected system of paved walkways designated for pedestrian use, usually located beside a street or roadway.

Street network: A system of interconnecting streets and intersections for a given area.

Sugar-sweetened beverages: Beverages that contain added caloric sweeteners, primarily sucrose derived from cane, beets, and corn (high-fructose corn syrup), including nondiet carbonated soft drinks, flavored milks, fruit drinks, teas, and sports drinks.

Supermarket: A large, corporate-owned food store with annual sales of at least 2 million dollars.

Underserved census tracts: Within metropolitan areas, a census tract that is characterized by one of the following criteria: 1) a median income at or below 120 percent of the median income of the metropolitan area and a minority population of 30 percent or greater; or 2) a median income at or below 90 percent of median income of the metropolitan area. In rural, non-metropolitan areas, the following criteria should be used instead: 1) a median income at or below 120 percent of the greater of the State non-metropolitan median income or the nationwide non-metropolitan median income and a minority population of 30 percent or greater; or 2) a median income at or below 95 percent of the greater of the State non-metropolitan median income or nationwide non-metropolitan median income (US Department of Housing and Urban Development, 24 CFR Part 81, 1995).

Violent crime: A legal offense that involves force or threat of force; according to the Federal Bureau of Investigation's Uniform Crime Reporting Program, violent crime includes four offenses: murder, forcible rape, robbery, and aggravated assault (2).

Reference

1. Institute of Medicine. Preventing childhood obesity: health in the balance. Washington, DC: The National Academies Press; 2005.
2. US Department of Justice, Federal Bureau of Investigation. Crime in the United States, 2007. Washington, DC: US Department of Justice, Federal Bureau of Investigation; 2007. Available at http://www.fbi.gov/ucr/cius2007/offenses/violent_crime/index.html.

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