

Measuring Progress in Obesity Prevention: Workshop Report

DETAILS

158 pages | 6 x 9 | PAPERBACK

ISBN 978-0-309-22239-6 | DOI 10.17226/13287

AUTHORS

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MEASURING PROGRESS IN OBESITY PREVENTION

Workshop Report

Committee on Accelerating Progress in Obesity Prevention

Food and Nutrition Board

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS
Washington, D.C.
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THE NATIONAL ACADEMIES PRESS 500 Fifth Street, N.W. Washington, DC 20001

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This study was supported by a grant between the National Academy of Sciences and the Michael & Susan Dell Foundation; and Grant No. 61747 between the National Academy of Sciences and the Robert Wood Johnson Foundation. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the organizations or agencies that provided support for this project.

International Standard Book Number-13: 978-0-309-22239-6

International Standard Book Number-10: 0-309-22239-7

Additional copies of this report are available from the National Academies Press, 500 Fifth Street, N.W., Lockbox 285, Washington, DC 20055; (800) 624-6242 or (202) 334-3313 (in the Washington metropolitan area); Internet, <http://www.nap.edu>.

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Suggested citation: IOM (Institute of Medicine). 2012. *Measuring Progress in Obesity Prevention: Workshop Report*. Washington, DC: The National Academies Press.

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Willing is not enough; we must do.”*

—Goethe



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- CHRISTINA ECONOMOS**, New Balance Chair in Childhood Nutrition, Friedman School of Nutrition, Science, and Policy, Tufts University, Boston, MA
- SANDRA G. HASSINK**, Director, Nemours Pediatric Obesity Initiative, A.I. DuPont Hospital for Children, Wilmington, DE
- ANTHONY B. ITON**, Senior Vice President, Healthy Communities, The California Endowment, Oakland, CA
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- PHILIP A. MARINEAU**, Operating Partner, LNK Partners, San Francisco, CA
- VICTORIA RIDEOUT**, President, VJR Consulting, San Francisco, CA

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EDUARDO J. SANCHEZ, Vice President and Chief Medical Officer, Blue Cross and Blue Shield of Texas, Richardson, TX

ELLEN WARTELLA, Al-Thani Professor of Communication, Professor of Psychology and Professor of Human Development and Social Policy, and Director of the Center on Media and Human Development at Northwestern University, Evanston, IL

Study Staff

LYNN PARKER, Scholar and Study Co-Director

LESLIE J. SIM, Senior Program Officer and Study Co-Director

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HEATHER BREINER, Research Associate

MATTHEW B. SPEAR, Program Associate (until July 2011)

ELENA OVAITT, Senior Project Assistant (from August 2011)

ANTON L. BANDY, Financial Officer

GERALDINE KENNEDO, Administrative Assistant

LINDA D. MEYERS, Director, Food and Nutrition Board

Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We wish to thank the following individuals for their review of this report:

LISA M. KLESGES, University of Memphis
ROBIN A. MCKINNON, National Cancer Institute
PAMELA M. SCHWARTZ, Kaiser Permanente
GAIL WOODWARD-LOPEZ, University of California, Berkeley

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the final draft of the report before its release. The review of this report was overseen by **MELVIN WORTH**. Appointed by the Institute of Medicine, he was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authors and the institution.

Preface

Obesity is recognized as a paramount public health problem. Obesity and overweight are associated with cardiovascular disease, diabetes, certain forms of cancer, and other conditions that are primary causes of mortality and morbidity in the United States. Obesity increased sharply during the last few decades of the 20th century, and while some statistics indicate that the increase has leveled off, at least in selected population groups, overall rates remain unacceptably high. People who struggle with weight as children are far more likely than other children to do so as adults, and excess weight can cause myriad health problems throughout the life span. Obesity also is especially prevalent among racial and ethnic minorities and in low-income communities.

Those working to turn these trends around have faced an uphill battle. For example, the American public is awash in ever more sophisticated marketing of high-calorie foods and beverages with limited nutritional value, and many aspects of our society discourage the natural human impulse to move. These are among the reasons why attention is shifting from treating individual patients who are overweight or obese to addressing the powerful environmental and policy influences that operate at the community level and even more broadly in U.S. society.

At the same time, researchers must move swiftly to keep up with—and measure—rapidly changing influences on food and beverage consumption and physical activity. To maintain the urgency of combating the obesity epidemic and to identify actions that can accelerate progress in this effort, the Institute of Medicine (IOM) convened the Committee on Accelerating Progress in Obesity Prevention. Funded by the Robert Wood Johnson

Foundation and the Michael & Susan Dell Foundation, the committee met for the first time in September 2010 with a charge to review IOM's past obesity-related recommendations, identify a set of critical recommendations for future action, and recommend indicators of progress in implementing these actions.

This report summarizes the presentations and discussions at a 1.5-day workshop held in March 2011 as part of the committee's work. The purposes of the workshop were to explore and understand the ways in which measurement techniques, strategies, and data sources can impede or promote acceleration of progress toward prevention of obesity, and to understand what additional knowledge regarding assessments of environments and policies is needed to support measurement efforts. The workshop brought together experts in many relevant fields, including public health, epidemiology, nutrition, media studies and communication, economics, psychology, and public policy.

Given limitations of both time and scope, the workshop could not address all critical measurement issues. It is the committee's hope, however, that this report will help illuminate the opportunities for and challenges in measuring progress in obesity prevention.

We are grateful for the efforts of the expert speakers who contributed to the meeting (see the appendixes for the workshop agenda and biographical sketches of the committee members and speakers). Special appreciation also goes to Jamie Chriqui, Steve Kelder, Bill Kohl, and Ellen Wartella, the committee members who volunteered their time and intellectual efforts to shape the workshop programs and identify themes and contributors. In addition, we give special thanks to Alexandra Beatty, consultant, who prepared a comprehensive draft of the workshop report; Emily Ann Miller, who edited the workshop report and coordinated the workshop planning and the production of the workshop report; Heather Breiner, Elena Ovaitt, and Matthew Spear, who assisted with the preparation and execution of the workshop and production of the workshop report; and Leslie Sim and Lynn Parker, who oversaw the work of the committee and assisted with the workshop planning.

Daniel R. Glickman, *Chair*
Committee on Accelerating Progress in Obesity Prevention

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1

Introduction and Workshop¹ Goals

The prevalence of overweight and obesity² is high among children and adults in the United States and particularly so for some demographic groups, with serious health, economic, and social consequences. Carrying excess weight raises an individual's risk of health problems that include cardiovascular disease, gallbladder disease, type 2 diabetes, hypertension, dyslipidemia, and osteoarthritis, while psychosocial consequences of overweight and obesity may impair functioning and quality of life (IOM, 2005). Health problems related to obesity are also expensive: by one estimate, the annual medical burden of obesity could reach \$147 billion (Finkelstein et al., 2009). Additional costs to society come in the form of reduced productivity at and absenteeism from work and higher costs for disability and unemployment benefits, for example (Cawley et al., 2007; Finkelstein et al., 2005). The social costs of obesity can include stigmatization, discrimination, and teasing and bullying (IOM, 2005). In addition, national security is affected by rising rates of obesity. U.S. military leaders have recently

¹This report summarizes the views expressed by workshop participants, and while the committee is responsible for the overall quality and accuracy of the report as a record of what transpired at the workshop, the views contained herein are not necessarily those of the committee.

²Researchers classify adults with a body mass index (BMI) of 25 to 29.9 as overweight, those with a BMI of 30 or higher as obese, and those with a BMI of 40 or higher as extremely obese. Children and adolescents with a BMI for age and sex at or above the 95th percentile or at or above the 85th but below the 95th percentile (based on the Centers for Disease Control and Prevention's [CDC's] growth charts) are classified as obese or overweight, respectively.

described the role of obesity in reducing the pool of potential recruits to the armed services (Christeson et al., 2010).

Rates of adult and childhood obesity in the United States vary significantly by region and by race/ethnicity and age, but overall rates are high. Data from the 2007-2008 National Health and Nutrition Examination Surveys (NHANES)³ show that among adults aged 20 or older, nearly 34 percent have weight levels in the obese range, and another 34 percent are classified as overweight; thus the combined prevalence of obesity and overweight is nearly 68 percent (Flegal et al., 2010). Among children and adolescents aged 2 through 19, nearly 17 percent are classified as obese and 15 percent as overweight; thus close to 32 percent are either obese or overweight (Ogden et al., 2010).

While there is no evidence that underlying biological susceptibility to weight gain has changed, there is ample evidence of increases in such factors as the amount of food available; the palatability of food (i.e., increases in fat, sugar, and salt); and eating environments that are highly conducive to the consumption, often unintentional, of excess calories (Gearhardt et al., 2011; Kral and Rolls, 2004; Ledikwe et al., 2005; Story et al., 2008; Wansink, 2004). As a result, researchers and policy makers are focusing increased attention on environmental and policy factors that may affect obesity. Individual factors, including genetics, psychological issues, and social and cultural factors, play a role in people's diets, but so do the physical environments in which they live, the kinds of food that are accessible and affordable where they live and work, the marketing and other media messages they receive, and public policies such as requirements for sidewalks or provision of nutrition information in restaurants.

In this context, the Institute of Medicine (IOM) formed the Committee on Accelerating Progress in Obesity Prevention, which was charged to review IOM's past obesity-related recommendations, identify a set of critical recommendations for future action, and recommend indicators of progress in implementing these actions. Given the urgency of a problem that has been described as an epidemic, researchers and policy makers are eager to identify improved measures of the behavioral influences that may contribute to obesity and of the effectiveness of policies designed to reduce obesity rates. Accordingly, as part of its information-gathering process, the committee conducted a workshop in March 2011 to explore measurement methodology in obesity prevention. Held with the support of the Michael & Susan Dell Foundation and the Robert Wood Johnson Foundation, the workshop was an opportunity for the committee to discuss opportunities and challenges related to measurement and to hear from experts in many

³NHANES is a continuous program of studies designed to assess the health and nutritional status of a nationally representative sample of children and adults in the United States.

relevant fields, including public health, epidemiology, nutrition, media studies and communication, psychology, and public policy. The workshop was designed to support the committee in carrying out its charge, and not to serve as a forum for the committee to discuss findings or conclusions related to the charge.

This report summarizes the presentations and discussions at the workshop. Chapters 2 and 3 provide an overview of issues related to measurement in two key areas: Chapter 2 addresses physical activity and the built environment, while Chapter 3 focuses on food and nutrition policies and environments. Chapter 4 reviews the measures, data sources, and methods that relate to both of these environments and may help researchers and policy makers assess progress in obesity prevention. Chapter 5 examines marketing strategies, public health campaigns, and data on marketing exposure. Chapter 6 focuses on state and local policy efforts, exploring both existing measures of their effectiveness and possibilities for the future. Chapter 7 addresses the ethnic, geographic, and other disparities in obesity prevalence that must be considered in measuring progress in obesity prevention. The final chapter presents a summary of key themes from the workshop.

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2

Physical Activity and the Built Environment

Key Points Noted in Presentations

- Physical activity is encouraged or discouraged by characteristics of the physical and built environment (such as walkability or the availability and condition of parks and recreational spaces), none of which are under the control of the public health sector.
- Researchers use surveys, observations or audits, geographic information system (GIS)-based data, policy measures, and crime data to assess physical activity environments and policies, but a surveillance system that provides accurate, reliable, and complete data currently does not exist.
- Non-health sectors need to be engaged in the collection of these data because data related to the built environment are not routinely collected by the health sector.
- Clear national objectives need to be established for the collection and use of data related to physical activity environments.

The reasons people become overweight or obese are multifaceted, but the story begins with a mismatch between calories consumed and the body's capacity to burn that energy. Many factors influence the rate at which an individual burns calories and the number of calories he or she consumes

and burns in a day, but the environments in which people live can have a profound impact on the amount of physical activity in which they engage. Public policy plays a role: declines in the rates at which children walk to school and adults use public transportation, for example, have coincided with the obesity epidemic, and such trends in part reflect changes in zoning and land use, funding for public transportation, and other policies. James Sallis, professor of psychology at San Diego State University, and Christine Hoehner, assistant professor in the Division of Public Health Sciences at Washington University in St. Louis, discussed the environmental and policy factors that likely affect physical activity levels, especially in young people; the pros and cons of existing ways of measuring the effects of the environment; and possible ways to improve measurement in this area.

ENVIRONMENTAL AND POLICY INFLUENCES ON PHYSICAL ACTIVITY

Presenter: James F. Sallis

An ecological model of health behavior, Sallis explained, is a way of taking into account the impacts of society and culture, the physical environment, and public policy on the behavior of individuals, who are also influenced by biological and psychological factors and their own skills and knowledge. Figure 2-1 illustrates the complexity of the ways in which the environment affects levels of physical activity. The shaded circle represents the four domains in which people can be active: at home, at work or school, during recreation, and in moving from place to place. The other circles depict the many factors that influence how active people are in each domain. Thus, for example, the upper right quadrant shows how people's level of activity while commuting, doing errands, and making other trips depends on their own characteristics; their perceptions of how convenient and accessible different modes of transport might be; the characteristics of the immediate environment (e.g., paths for biking and walking, traffic); and policies such as zoning codes, traffic management, and investments in public transportation.

Settings where it is possible to walk and bike to everyday destinations and to engage in outdoor recreation (such as in parks and playground) support physical activity. What these settings have in common, Sallis noted, is that none of them are under the control of the public health sector. He explained that policies, whether formal or informal, issued by government or the private sector, can affect physical activity in four ways. First, zoning and building codes and the design of transportation and recreation facilities all affect the *built environment*. Second, policies affect *programs*, such as physical education requirements in schools and sports programs and

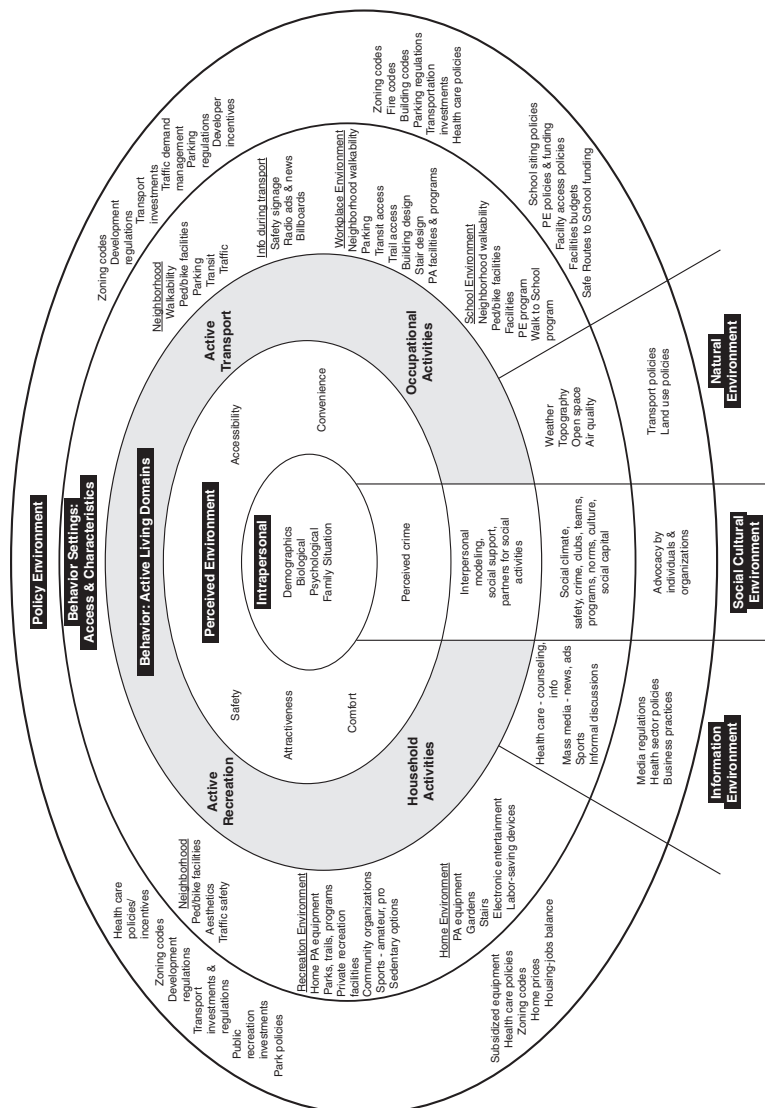


FIGURE 2-1 Ecological model of four domains of active living.

NOTES: PA = physical activity; PE = physical education; ped = pedestrian.

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leagues in parks and recreation centers. Policies can also offer *incentives*, such as insurance discounts, subsidies for parking or commuting by bicycle, or cash in lieu of parking subsidies for workers who commute without cars. Finally, whatever the approach, secure *funding* for policies and programs is a critical element.

Research

Researchers have examined the relationships among these factors and physical activity systematically, and Sallis summarized their findings on attributes of the built environment (Sallis and Kerr, 2006). One example is walkability. Numerous studies have shown that when it is easy to walk to school, work, and local businesses, people do walk, as well as ride bicycles, more. A more modest number of studies have shown that people are more likely to walk where there are sidewalks, although the relationship here is less consistent. People who live near parks, private health clubs, playgrounds, and other recreational facilities engage in more physical activity, researchers have found, but the aesthetic characteristics of the facilities make a difference. Thus, not surprisingly, a park that is run down and not kept clean and safe is less likely to attract those who live nearby to engage in physical activity. In answer to a question, Sallis noted that a small amount of research has begun to explore the associations between the built environment and levels of fitness, although one would expect the higher activity levels in supportive environments to lead to increased fitness.

Sallis presented preliminary results from a review he and colleagues were conducting of several hundred studies of the specific associations between attributes of the built environment and physical activity levels in youth (Figures 2-2a and 2-2b). The results are in line with the general findings from studies of adults. However, studies of youth appear to show less consistent associations between neighborhood environments and physical activity. The bars represent the percentages of studies that demonstrate the associations one would expect for particular features, and they point to features that might be most rewarding from a policy perspective, such as walkability. For youth, the most consistent associations are with mixed land use (a component of walkability) and access to parks and recreational facilities. Findings differed according to whether environmental attributes and physical activity were measured objectively or by self-report.

For reducing childhood obesity, Sallis added, characteristics of schools are key. He noted that the quantity and quality of physical education time, recess, classroom breaks, after-school programs and joint-use agreements that allow community access after school hours, the nature of the school grounds, and the distance of schools from students' homes all are related to activity levels. Measuring the degree to which these features influence

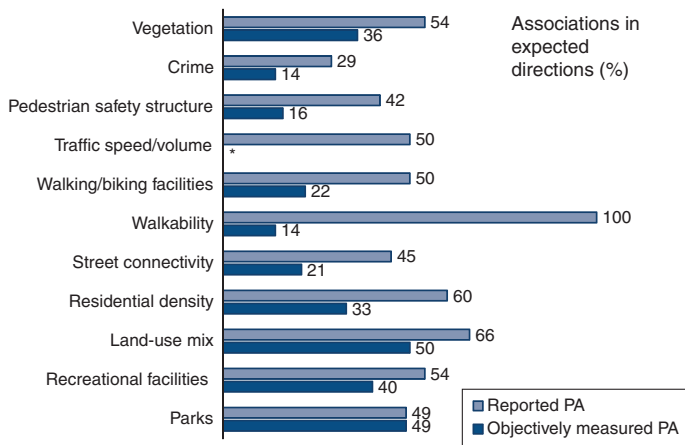


FIGURE 2-2a Associations between objectively measured attributes of the built environment and physical activity among youth.

NOTE: Data presented were preliminary; final results were separated by children aged 3-12 and adolescents aged 13-18 and are presented in Ding and colleagues (2011). PA = physical activity. * Data not reported for objectively measured PA for this attribute.

SOURCE: Sallis, 2011.

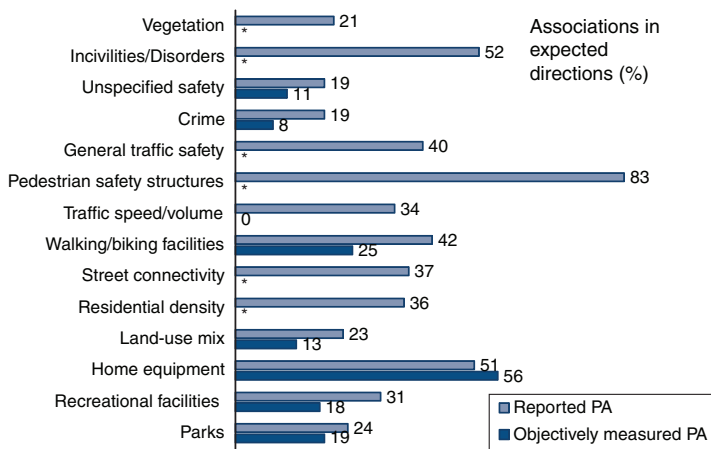


FIGURE 2-2b Associations between perceived attributes of the built environment and physical activity among youth.

NOTE: Data presented were preliminary; final results were separated by children aged 3-12 and adolescents aged 13-18 and are presented in Ding and colleagues (2011). PA = physical activity. * Data not reported for objectively measured PA for this attribute.

SOURCE: Sallis, 2011.

physical activity would require another, more complicated, type of analysis, he noted in response to a question. He concluded from these preliminary results that there is strong support for the value of a few features, whereas others have not been extensively studied.

Sallis summarized the role of policy in Table 2-1. The table shows the relationships among attributes that can influence physical activity, the policies that shape those attributes, and the decision makers who can implement the policies.

TABLE 2-1 Relationships Among Selected Influences on Physical Activity

Environment Attribute	Policy Determinant	Decision Makers
Mixed land use	Zoning	Local governments (as informed by planning officials)
Street connectivity	Guidelines, standards	Institute of Transportation Engineers; developers; local governments
Residential density	Zoning	Local governments (as informed by planning officials)
Pedestrian/bicycle facilities	Transport/complete streets*	Transportation departments; state and local governments
Traffic volume/speed	Transport	Transportation departments; governments
Transit access	Transport	Transportation departments; governments
Parks, trails	Park and recreation standards and funding	Developers of national standards; local governments
Private recreation facilities	Marketplace	Business owners
Aesthetics, vegetation	Various	Multiple
School grounds, siting	Standards, joint-use agreements	State education departments and governments

*A complete street is a road designed and operated to be safe for all users, including drivers, bicyclists, transit vehicles and users, and pedestrians of all ages and abilities.

SOURCE: Sallis, 2011.

Measurement Tools

Given this portrait of the possible ways of boosting physical activity levels, what would be the objectives of measuring progress? First, Sallis observed, one would want to measure the simple presence or absence of an environmental attribute or policy, as well as its characteristics and quality. For example, does the park have a playground? Second, the quality of the attribute should be evaluated. For example, is the equipment in good shape? Is the physical education program required or recommended? Third, are there disparities in access? In using data on these attributes and policies, one must also consider the geographic scale of the measures, Sallis added. For example, if a county had 5 acres of park land for every 1,000 people, one would still want important to know how the parks were distributed by neighborhood, so local-level data are important. Sallis outlined a number of options for measuring environmental attributes and policies.

Surveys

In surveys, people are asked to report on the attributes of their neighborhoods. There are validated measures of attributes of neighborhood environments, and the Centers for Disease Control and Prevention (CDC), for example, has funded a brief survey (Sallis et al., 2010) on neighborhood environments that provides a validated measure. However, Sallis said, validated, self-reported surveys of parks, trails, and school environments are lacking. He also said that measures need to be adapted for racial and socioeconomic status subgroups, and that measures for rural environments are still in development. Sallis believes a survey approach could be used for national surveillance, but research is needed to refine such an approach. Surveys would be the lowest-cost option and could be deployed nationwide relatively quickly.

Observation or Audits

Trained data collectors can count streets, parks, trails, and other features, and these counts provide useful data. However, Sallis explained, these data are expensive to collect. They can yield large amounts of information, but there is as yet no accepted method of scoring and summarizing the findings. Researchers also have not yet devised ways to connect these counts to people's behaviors or to place them in context. Ideally, Sallis suggested, more concise instruments and improved scoring procedures would allow community or advocacy groups to assess their own neighborhoods. In addition, web-based programs such as Google could be a lower-cost alternative to in-person audits.

Geographic Information System (GIS)

A GIS has been defined as the “integration of software, hardware, and data for capturing, storing, analyzing, and displaying all forms of geographically referenced information.”¹ This sort of mapping can provide highly detailed data, for example, about the land devoted to different purposes in a local area and, Sallis explained, has the potential for managing and displaying national-level data as well. At present, however, data are collected by a variety of local and national entities, including tax assessors, departments of parks and transportation, and private companies. The quality and currency of the data are inconsistent, Sallis said, and there is little standardization in what is collected or how, or in what is accessible to researchers. For example, a transportation department might have detailed information about local roads but collect nothing on sidewalks or bicycle facilities because they are not a priority. Thus, Sallis explained, if agencies not typically concerned with public health issues could be persuaded to include health-related data in their collection efforts, and if consensus could be developed on variables, a GIS could be much more useful for collecting data related to physical activity.

Policy Measures

Enumerating and rating policies at the local level that may have an impact on physical activity is another approach. However, Sallis explained, it is difficult to collect information on and monitor local policies, and there is significant variation in their nature and purpose. An online system for tracking such policies would be useful, he suggested, as would increased standardization of ways to describe policies and their specific attributes. Further work on ways to assess variations in the ways policies are implemented would also be valuable.

Crime Measures

Crime data are useful for understanding local environments, and a national system for collecting such data would be useful. Unfortunately, Sallis explained, the way information is coded in this area also lacks standardization. Connecting data to specific geographic points can be difficult, and the associations between crime levels and physical activity have not been clearly identified in research. Public health researchers would benefit from a systematic research agenda and from work with the Department of Justice to develop standardized accessible data.

¹See <http://www.gis.com/content/what-gis> (accessed August 30, 2011).

Collaboration with Non-health Sectors

Sallis concluded by noting that, while health researchers and agencies need more and better data to understand clearly the influence of the physical environment on obesity, improved data systems to meet this need will depend on collaboration with other groups outside of the health field. Such groups have different priorities from health research entities and are just as likely to face tight budgets. Nevertheless, much of the data on land use, transportation, education, crime, and commerce already being collected could be useful for health research, and could be more useful if coordinated and expanded in even modest ways. Such data would be extremely helpful to local and state health departments, but the existing state of affairs is difficult for them to sort out. “Health agencies will need to invest in these systems,” said Sallis. “Who will take the lead?”

SURVEILLANCE

Presenter: Christine Hoehner

Surveillance is important for public health researchers in any field, and each of the measures Sallis described may be used in surveillance, explained Hoehner. Surveillance serves numerous purposes. Using surveillance, researchers can assess the magnitude of a problem and how it is distributed geographically, as well as monitor changes over time in its patterns. Surveillance can also help in defining a problem and generating hypotheses or research targets and in evaluating the effectiveness of intervention strategies, as well as support planning decisions and policy development. Most important, Hoehner observed (quoting a publication by Institute of Medicine committee member Jamie Chriqui and colleagues), is that “what gets measured, gets changed” (Chriqui et al., 2011). She explored whether current measures related to physical activity and the built environment are “accurate; reliable; feasible to collect across diverse communities; sensitive in detecting change to the environment and policies associated with physical activity; and responsive to the data needs of advocates, decision makers, and planners at the local level.”

When surveillance is effective, the result is an ongoing information loop, Hoehner explained, that works as shown in Figure 2-3. In practice, however, the surveillance loop for a given public health issue is usually incomplete because connections may not have been forged, and data may be unavailable. In these cases, decisions are made without the necessary data. The loop also illustrates that the physical environment and activity levels are influenced by many sectors of public life and levels of government and that policies involve many stages, said Hoehner.

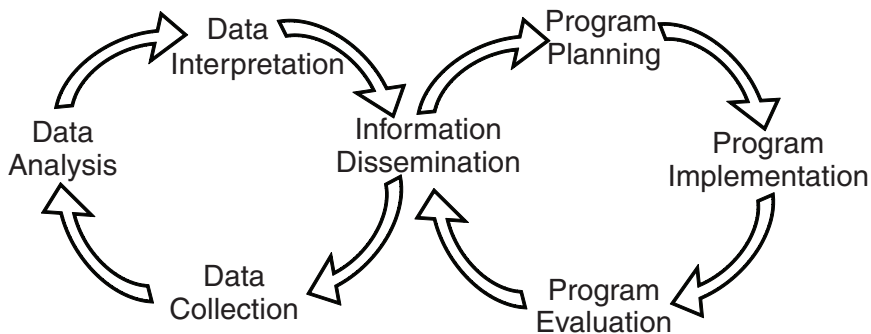


FIGURE 2-3 Public health surveillance loop.

SOURCE: Remington and Goodman, 1998. Reprinted with permission from the Sheridan Press: [American Public Health Association] Remington, P. L., and R. A. Goodman. 1998. Chronic disease surveillance. In *Chronic disease epidemiology and control*. 2nd ed., edited by R. C. Brownson, P. L. Remington, and J. R. Davis. Washington, DC: American Public Health Association.

National Objectives for Physical Activity Environments and Policies

Ideally, surveillance is guided by national objectives. Hoehner explained that in the case of physical activity, the National Physical Activity Plan—developed under the sponsorship of numerous organizations, including the YMCA, the American Cancer Society, and the American Heart Association, and launched in 2010—describes policies and programs designed to promote physical activity “to improve health, prevent disease and disability, and enhance quality of life.”² The plan offers recommendations directed to eight sectors with potential influence: business and industry; education; health care; mass media; parks, recreation, fitness, and sport; public health; transportation, land use, and community design; and volunteer and nonprofit organizations. These recommendations include surveillance and reporting of data.

Another initiative, Healthy People 2020, outlines a set of specific objectives for boosting physical activity (selected objectives are shown in Box 2-1) and emphasizes the importance of nationally representative data. CDC also includes among its objectives for reducing obesity three that are specific to physical activity, along with suggested measures. All of these plans highlight the fact that the necessary data are not consistently available, particularly at the local level, Hoehner pointed out.

²See <http://www.physicalactivityplan.org/>.

BOX 2-1
Physical Activity Environment/Policy Objectives for
Healthy People 2020

1. Increase the proportion of the nation's public and private schools that require daily physical education for all students.
2. Increase regularly scheduled elementary school recess in the United States.
3. Increase the proportion of school districts that require or recommend elementary school recess for an appropriate period of time.
4. Increase the proportion of the nation's public and private schools that provide access to their PA [physical activity] spaces and facilities for all persons outside of normal school hours.
5. Increase the number of states with licensing regulations for PA provided in child care.
6. (Developmental)* Increase the proportion of employed adults who have access to and participate in employer-based exercise facilities and exercise programs.
7. (Developmental)* Increase legislative policies for the built environment that enhance access to and availability of PA opportunities.

*There is currently no national baseline data for developmental objectives, but they should have a confirmed nationally representative data source that will ultimately provide baseline data and at least one tracking point. Developmental objectives address areas of national importance for which investments should be made over the next decade to measure their change (<http://healthypeople.gov/2020/about/aboutdata.aspx> [accessed August 30, 2011]).

SOURCE: <http://healthypeople.gov/2020/topicsobjectives2020>.

Measurement Tools and Gaps

At present, surveys, GIS, and auditing and observational tools are the primary sources of data for physical activity and the built environment, as Sallis described. Hoehner provided additional detail on how these three approaches are used to measure physical activity.

Surveys

Surveys generally are conducted by mail or telephone and provide specific information about the characteristics of an environment, depending on the number of questions asked (which may vary significantly). Two instruments used for surveillance of the built environment are the Environmental Supports for Physical Activity survey (SIP 4-99 Research Group, 2002) and the Physical Activity Neighborhood Environment Scale (PANES) (Sallis et al., 2010). While these instruments provide valuable data at low

cost and cover many regions where observational data are unavailable, it is important to note, Hoehner explained, that agreement between the perceptions captured by surveys and objective measures is relatively low. Differences may be accounted for by differing definitions of a neighborhood's boundaries or other relevant factors, variation in people's expectations and perceptions, or measurement error. Hoehner stressed that, although the difference should not be overlooked, the perceived environment can be measured reliably and is associated with physical activity. She noted that it would be useful to collect more of this type of data because the tools needed to do so are available at the national level.

Geographic Information Systems

GIS data provide the only feasible objective measures of the built environment across large areas, Hoehner explained. Although much of this type of data currently is collected by non-health sectors, she continued, it provides information about parks, indoor recreation facilities, land use, streets and public transit, vegetation, traffic accidents, and neighborhood deprivation. The sources and scope of these data are shown in Table 2-2.

Although valuable, GIS-based data can be costly to collect, and they currently vary considerably in terms of regions covered, geographic scale, and type of data. Locally collected data may not be readily available to researchers, for example. Quality may vary as well, and in some cases the origin of the data is unknown. There is relatively little standardization in what is included in the data, and in many cases, details about features particularly relevant to physical activity are lacking. For example, Hoehner described her experience with data on parks in the Dallas-Fort Worth area that were difficult to use for research. From an initial count of 2,800 parks, she and her colleagues eventually arrived at a count of approximately 2,000 because records from multiple sources may have included features that were not actually parks, such as medians, cemeteries, or mobile home parks. At the same time, some parks evident in aerial photographs or other sources had to be added.

Commercial databases are another source of information about the locations of food and physical activity establishments that can be integrated with GIS, Hoehner noted, and two studies have examined their validity. Boone and colleagues (2008) compared commercial data with data from a field census and found moderate agreement: 39 percent for nonurban areas and 46 percent for urban areas. The agreement varied by facility type. Hoehner and Schootman (2010) conducted a similar comparison—of measures by InfoUSA and Dun & Bradstreet (two major commercial data sources) versus independent measures of census tracts in the St. Louis area. They found “mostly fair” agreement among databases: 32 percent. These

TABLE 2-2 GIS-Based Data Collected by Non-health Sectors

Type	Source	Scale
Parks and open space	Park and recreation departments National/state parks	Local National/state
Indoor recreation facilities	Commercial databases (InfoUSA, Dun & Bradstreet)	National
Land use	Parcel databases	Local
Density	U.S. Census/American Community Survey	National
Streets	Census TIGER ESRI Streetmap Transportation or planning agency	National National Local
Sidewalks and bicycle facilities	Transportation or planning agency	Local
Vegetation	U.S. Geological Survey's Landsat*	National
	USDA National Agriculture Imagery Program	National
Crime	FBI Uniform Crime Reports (city/county) Local police departments	National Local
Traffic accidents	Motor vehicle accident reports	State or local
Neighborhood deprivation	U.S. Census/American Community Survey observations	National

NOTES: ESRI = Environmental Systems Research Institute; ESRI develops GIS to address social, economic, business, and environmental concerns at the local, regional, national, and global scales. FBI = Federal Bureau of Investigation. TIGER = Topologically Integrated Geographic Encoding and Referencing; Census TIGER is the name for the system and digital database developed at the U.S. Census Bureau to support its mapping needs for the decennial census and other Bureau programs. USDA = U.S. Department of Agriculture.

*Landsat is a global land-imaging project that provides space-based images of the earth's land surface, coastal shallows, and coral reefs.

SOURCE: Hoehner, 2011.

databases contain a great deal of error, Hoehner observed, so researchers should exercise caution when using them.

In short, GIS-based measures are valuable, but the lack of standardization in the underlying spatial data limits their usefulness, and there is a paucity of studies including measures of sidewalks, crime, park qualities,

and vegetation. Additionally, GIS-based measures provide limited information about many features, particularly those related to the interactions between the built and social environments, such as crime, disorder, and public access.

Audits and Observational Tools

These tools provide measures of urban design features that are not observable remotely as with GIS or aerial photographs, such as sidewalk quality, incivility, or lighting.³ They are more useful for community assessment and advocacy than for surveillance. Hoehner and her colleagues (Brownson et al., 2009) reviewed 20 tools used for audits and observations and found that they covered a range of domains. Most covered land use, streets and traffic, sidewalks, bicycling facilities, public space/amenities, building characteristics, parking, maintenance, and safety. Few, however, covered such issues as the presence of dogs, noise, or signage. These tools have high rates of interrater reliability, in the range of 0.6 to 0.8; the rates are highest for measures of physical features, such as land use and transportation environments, and lower for other attributes, such as social and physical disorder. Challenges in the use of these tools are similar to those for GIS-based data: cost, lack of scoring protocols, and difficulty of analyzing complex data.

Analysis, Interpretation, and Dissemination of Data

Given the available measures described above, Hoehner noted, a variety of questions about analyzing, interpreting, and disseminating the data must be considered. For example, if improving GIS measures in order to develop an improved national sample were identified as a goal, one would need to consider who would be responsible for collecting, analyzing, and disseminating the data (for example, CDC, state or local health departments, universities); which geographic areas should be covered; what resources would be required; what measures would be reported; and how the data would be made accessible and useful to advocacy groups and decision makers.

Several current initiatives, Hoehner observed, involve collecting standardized data across jurisdictions. Communities Putting Prevention to Work, a project of the U.S. Department of Health and Human Services, has engaged approximately 50 communities in working to reduce the rate of diseases related to obesity and tobacco consumption using environmen-

³Many tools for audits and observations are listed on the Active Living Research website, maintained by the Robert Wood Johnson Foundation (www.activelivingresearch.org [accessed July 2011]).

tal policy strategies. Communities are encouraged to use an evaluation tool—designed to identify existing community activities and develop action plans—that Hoehner said has been deemed useful for surveillance. Bridging the Gap, a program funded by the Robert Wood Johnson Foundation, is examining policy and environmental measures in a nationally representative sample of 150 to 200 communities defined by school catchment areas. Other initiatives include Healthy Kids; Healthy Communities, which uses online tracking to explore community partnerships; and the Childhood Obesity GIS System, an online tool for mapping many types of data. Finally, the National Collaborative on Childhood Obesity has developed a web-based registry of valid and reliable measures⁴ (discussed in greater detail in Chapter 4), which Hoehner explained is expected to help in identifying gaps in measurement.

Recommendations

Hoehner closed by offering some recommendations, many of which echoed Sallis's comments. Working with those outside the health sector who do or can collect valuable data, she believes, will be critical to improving the information base. At the same time, it will be important to give priority to measures that address national objectives and strategies. Collecting data periodically will enable the assessment of trends over time. Hoehner also argued that methods and measures that can be developed most easily and quickly to support the development and modification of policies for the built environment should be an early priority. Finally, both the establishment of priorities and the lessons to be learned from existing initiatives should support sound decisions about the collection, analysis, and interpretation of these data.

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3

The Food and Nutrition Environment

Key Points Noted in Presentations

- The food environment is complex, and food consumption is influenced by many factors at different levels. Research examines mainly the community environment (types, locations, marketing, and accessibility of food outlets) and the consumer environment (foods found within stores, restaurants, and other outlets, as well as marketing and information about the foods, such as price).
- Although a primary focus has been on individual consumption, many ongoing efforts to collect data, as well as newer research designs and data collection tools, have expanded knowledge of food environments and policies.
- Any environment in which food is marketed, offered, or sold can be assessed in terms of dietary quality.
- Areas suggested for additional progress include
 - tracking change over time;
 - developing standardized definitions of key variables and other ways of facilitating the sharing and integration of data from different sources; and
 - matching measures and methods to questions of interest to allow for meaningful analysis and comparison at all levels of the food stream.

Measures of the food and nutrition environment have much in common with those used to measure physical activity, and many parallel issues arise in both contexts. Karen Glanz, George A. Weiss University Professor, professor of epidemiology in the Perelman School of Medicine, and professor of nursing in the School of Nursing at the University of Pennsylvania, provided an overview of the ways in which food environments—and the effects of policies that influence them—are measured, and reviewed some limitations of the measurement tools currently available. Susan M. Krebs-Smith, chief of the Risk Factor Monitoring and Methods Branch in the Division of Cancer Control and Population Sciences at the National Cancer Institute, focused on surveillance in this area and the potential for expanding the focus of dietary surveillance from individual-level behaviors to the community- or national-level food environment.

UNDERSTANDING FOOD ENVIRONMENTS AND POLICIES

Presenter: Karen Glanz

As with physical activity, food choices are influenced by many factors. Glanz presented an ecological model (Figure 3-1) to illustrate these factors, similar to the physical activity model presented by Sallis. In the food choice model, the large boxes connecting to the concentric circles list the specific influences by category; the smaller boxes list the primary means by which these influences affect behavior.

The picture is highly complex, Glanz acknowledged. A second illustration (Figure 3-2) models similar ideas but highlights the environmental variables that she believes can be measured but have not been adequately studied, such as the locations of food outlets and the availability of healthy options at a given outlet.

In Glanz's view, it is important when considering food issues to distinguish between the community environment (encompassing the types and locations of restaurants and supermarkets and their accessibility within a particular community) and the consumer environment (what consumers encounter when they go out to eat or to purchase food, whether in a restaurant, at school, or elsewhere) (Glanz et al., 2005). The consumer environment is the category that encompasses such factors as the availability of healthful or less healthful food choices within food establishments, the availability of nutrition information, pricing, and product placement. "Food is a commodity, and food products are a big business," Glanz added. While many industries and government sectors have an interest in physical activity, it is a behavior, not a commodity, and industry is "very invested in food in a different way" she said. Food is also highly regulated through safety and hygiene rules, taxation, and policies regarding both foods and

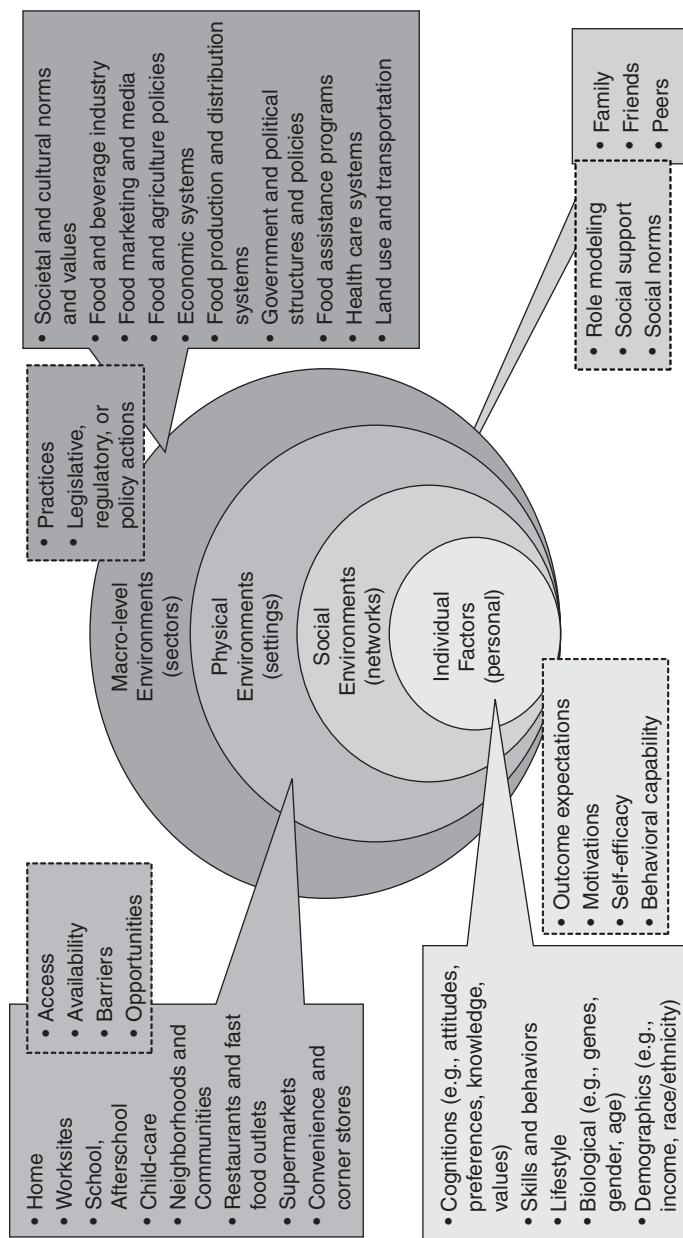


FIGURE 3-1 An ecological framework depicting the multiple influences on food choices. SOURCE: Story et al., 2008. Annual Review of Public Health Copyright 2007 by ANNUAL REVIEWS, INC. Reproduced with permission of ANNUAL REVIEWS, INC. in the format Other book via Copyright Clearance Center.

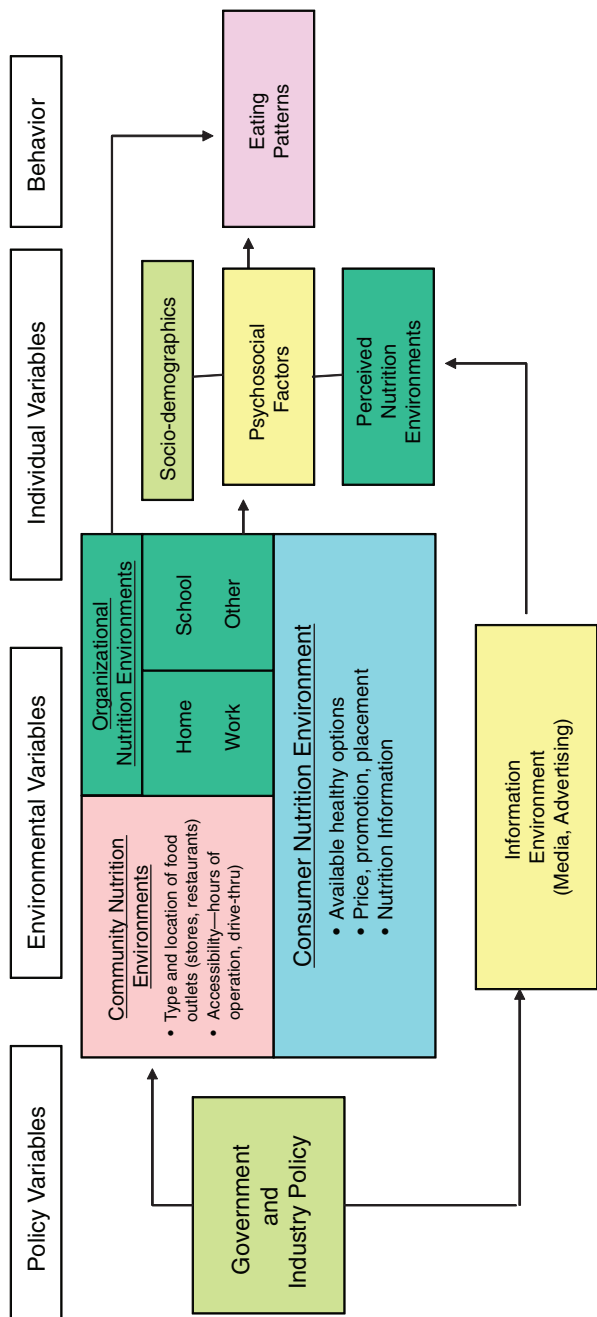


FIGURE 3-2 Model of community nutrition environments.
 SOURCE: Glanz et al., 2005. Annual Review of Public Health Copyright 2005 by ANNUAL REVIEWS, INC. Reproduced with permission of ANNUAL REVIEWS, INC. in the format Other book via Copyright Clearance Center.

nutrients, for example, which adds considerable complexity to the business of food.

Policy can influence food availability and food choices in a variety of ways, Glanz added. Federal and state policies regarding the nutritional value of foods served in public schools, price supports for agricultural products, and food assistance policies may all have significant influence, and Glanz noted that changes in such policies during the last decade are beginning to yield benefits. “We’d like to think,” she observed, “that most food-related government policies are designed to improve health,” but not all are, and other efforts to promote health may be defeated politically. The food environment also can evolve in the absence of policies, she added, because commercial enterprises do not necessarily look to government’s goals as they make marketing decisions.

Measures

Given this complex picture of influences on food choices, Glanz explained, there are five reasons for the measurement of food and nutrition environments:

- *Observation*, or simply observing what is available and what people eat and why they eat the way they do in the different environments to which they are exposed
- *Explanation* of the reasons for people’s choices
- *Evaluation* of the results of programs and strategies
- Support for *advocacy* or other actions
- *Surveillance*, or ongoing monitoring to identify trends and problems

A variety of data sources support these goals. Glanz noted, much the same as those used to measure physical activity: self-report surveys; observations and audits; databases that may exist for other purposes but contain food-related information; and GIS-based measures, which track the locations of food outlets, for example.

Glanz described a few examples of current efforts to measure food environments and policies in schools, worksites, food stores, restaurants, and local/state communities. There is a long history of measuring health policies affecting public schools, she noted, and this is an area in which the Centers for Disease Control and Prevention (CDC) has taken the lead. The School Health Policies and Programs Study, for example, has assessed such issues as vending machines’ offerings of junk foods (Kubik et al., 2010) and offerings of fruits, vegetables, french fries, and high-fat baked goods in elementary, middle, and high schools in all states since 1994. The School Nutrition Environment State Policy Classification System compares

state policies in 11 policy areas related to food (Mâsse et al., 2007). A third study that explores the school context is the Food and Beverage Environmental Analysis and Monitoring System (FoodBEAMS), in which competitive foods and beverages offered in schools are assessed and linked to nutritional databases so that adherence to nutritional guidelines can be monitored (Bullock et al., 2010). Glanz observed that studies tend to focus on the availability of healthy foods but, she believes, should also examine the availability of unhealthy, competing choices.

A modest amount of research has explored the food environments in worksites. One example is the Working Well Trial (WWT) (Patterson et al., 1998), in which researchers examined access to healthy food and nutrition information in more than 100 worksites as part of a cancer prevention trial. The researchers collected self-report data and found an association between interventions designed to alter food choices and changes in workers' choices. An Australian study of a number of aspects of the workplace included a nutrition component, collecting data on such features as availability of nutrition information, cafeteria options, and food in vending machines (Oldenburg et al., 2002). The researchers used a measure developed by Australia's National Heart Foundation to track workers' food choices.

Data are available regarding the types and locations of food stores and restaurants, but less measured are variables affecting access to these outlets, such as hours of operation and drive-through options, Glanz explained. States, counties, and cities all maintain lists of food establishments for licensing purposes, she noted, and commercial enterprises such as Dun & Bradstreet and InfoUSA also collect such data. Wang and colleagues (2006) found, however, that these data generally are not complete, up to date, or altogether accurate. They noted, for example, large discrepancies in the counts produced by state boards and by business directories. Using any single list is not likely to be adequate, Glanz observed. Counting food establishments is "a messy business," she suggested, because, for example, some may be located within other buildings and not fully accessible to the public.

The consumer nutrition environment also has attracted considerable research attention. Observational measures have been used to assess the environments within food stores. An early example is the Food Availability Survey, conducted in 1986 (Sallis et al., 1986), which audited the presence of 71 different heart-healthy foods in food stores. Cheadle and colleagues (1990, 1991, 1993) built on this work by reporting on a smaller number of items but comparing results with those from community surveys. Glanz also described the Nutrition Environment Measures Survey (NEMS), which

has examined foods in retail stores, as well as restaurant offerings.¹ The restaurant component of NEMS addresses such issues as price, promotion, and children's menus, along with choices available in stores and vending machines. Measures used in stores cover the availability of healthful choices, prices of healthy and less-healthy foods and how they vary by store type and neighborhood, and the quality of fresh produce.

NEMS was originally developed for research purposes, but the information collected has also been used for community assessments, for advocacy, and in the design of interventions. The measurement tools developed for NEMS proved useful for these other purposes, Glanz explained. Funding from foundations and state health departments has allowed for expanded dissemination of results as well as tools and training for those who wish to use the data. The measures are widely available in different technological formats, and individuals from 40 states have now been trained.

Glanz also described a CDC project, the Common Community Measures for Obesity Prevention (which has a physical activity component as well). This project, she explained, was designed to provide communities and local governments with measures they could use to plan and monitor environmental and policy changes related to obesity prevention. The food-related measures included whether communities had a plan for applying the Dietary Guidelines for Americans² in their government facilities and largest school district, the numbers of full-service grocery stores (per 10,000 people) in their three largest underserved census tracts, and the availability of government incentives to retailers for offering healthy food and beverages.

In answer to a question, Glanz noted that some surveys focus on consumer behavior and attitudes, but those topics have been relatively difficult to study. One approach used has been to look at receipts or intercept customers as they exit food stores to do a quick survey of their purchases as a way of assessing responses to calorie labeling. It is not always easy to obtain sales data, however, which, according to Glanz, would be "much stronger and more comprehensive." The issue of attitudes and other influences on individuals' choices is important, a workshop participant noted, because time pressure has meant that a shrinking proportion of food consumed is actually prepared at home from unprocessed ingredients. Glanz agreed, and said that prepared, take-out food is the fastest-growing segment of the supermarket business and that foods obtained away from home generally have more fat and calories than those prepared at home. Furthermore,

¹For more information about NEMS, see <http://www.med.upenn.edu/nems/> (accessed July 2011).

²For more information about the Dietary Guidelines for Americans, a source of research-based nutrition recommendations, see <http://www.health.gov/dietaryguidelines/> (accessed July 2011).

studies of behaviors and attitudes could better assess, for example, whether declines in cooking skills are now playing a role in people's food choices.

Research

Glanz noted that many measures now available did not exist even 4 or 5 years ago, so "tremendous progress" has been made.³ Published studies have used a variety of research designs: cross-sectional or correlational, comparative, longitudinal or prospective, experimental (looking at pre- and post-intervention, for example), and quasi-experimental. Randomized controlled trials are sometimes conducted, but in Glanz's view they are not essential; they are expensive, and in many circumstances they are either inappropriate or infeasible.

Glanz also stressed that available measures may be quite accurate for a single point in time but less useful for tracking change over time. Studies by Cheadle and colleagues (1991, 1993, 1995) illustrate this point. The early studies identified a clear association between the characteristics of a grocery store environment and community members' reports of their eating patterns. The correlations were less strong, however, as the researchers followed the community over time, and when they were able to compare three points in time, the results were inconsistent and contradictory.

Thus, for Glanz, examining the capacity of measurement tools is an important component of the needed research on food and nutrition, but many unanswered questions remain. It is not clear, she observed, what degree of environmental change will be needed to bring about meaningful changes in food intake and, ultimately, in obesity, or how long meaningful change might take. Relatively little is known about which people respond to interventions that have been tried.

Limitations of Measures

Efforts to measure the food environment are hampered by several factors, Glanz noted. The food environment is complex, variable, and far from static. For example, the variation in portion sizes at restaurants makes it difficult to assess nutritional value. Field-based measures have practical limitations because of this complexity. Researchers also lack common metrics for many of the features they want to measure, and not all measures

³Glanz suggested several resources for further information: a web compilation of measures and articles, at <https://riskfactor.cancer.gov/mfe/>; the Healthy Eating Research website, at www.healthyeatingresearch.org; Your Food Environment Atlas, at <http://www.ers.usda.gov/foodatlas/>; and the NCCOR Catalogue of Surveillance Systems, at <http://tools.nccor.org/css/> (accessed July 27, 2011).

are of equal psychometric rigor. Limited archival measures⁴ are available, and researchers do not know how sensitive measures are to change. Glanz's hope is that the field will eventually have a set of measures, based on shared definitions, that have been tested and proven valid and are feasible to use, adaptable to changing circumstances, and able to yield results that are easy to disseminate for wide use. In her view, it is also "increasingly important to tie those measures to calories, or to the foods that contribute the most calories to the diet." With those tools, she concluded, well-designed studies that permit reasonable inferences about the impact of interventions should help accelerate progress in reducing obesity.

SURVEILLANCE OF FOOD ENVIRONMENTS

Presenter: Susan M. Krebs-Smith

Currently, national surveys related to food and obesity focus mainly on the behavior of individuals, Krebs-Smith noted, but she believes a national surveillance system is needed to track nutrition-related environmental and policy changes and their effects. She offered her thoughts about what such a system would look like and the lessons that could be drawn from individual-level surveys.⁵

Prior studies have explored these questions in limited ways, Krebs-Smith noted. A series of reports issued by the National Nutrition Monitoring and Related Research Program during the early 1990s explored and developed a model of the relationships between food and health (Figure 3-3). The shaded boxes in this figure show the areas for which data have traditionally been collected.

More recently, Krebs-Smith explained, researchers have focused increased attention on the food stream and the additional levels through which food travels from the food supply to consumption by individuals. Figure 3-4 illustrates Krebs-Smith's suggested expansion of the various levels in the food stream that connect the food supply to individual consumption. Foods are in different forms as they travel through the levels from the food supply to individual consumption; the food supply contains raw agricultural commodities, foods in markets may be raw or processed, and foods consumed by individuals are ready to eat (and may include raw agricultural commodities or processed or prepared foods). This is an impor-

⁴That is, preexisting data that do not require new collection.

⁵Krebs-Smith noted that she was using "level" to refer to the unit of analysis (e.g., individuals' dietary intake) and "scope" to refer to the area to which a particular study's results apply, or the sampling frame.

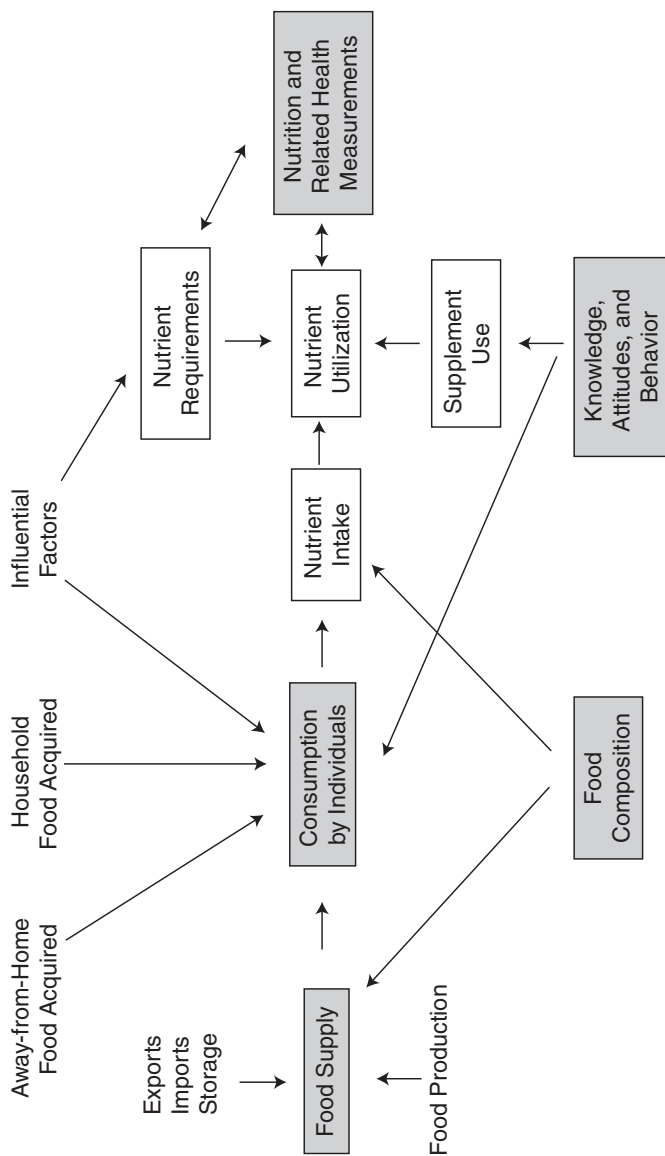


FIGURE 3-3 Diagram of the relationships between food and health.
 NOTE: Shaded boxes indicate that data have traditionally been collected for these factors.
 SOURCE: Adapted from HHS and USDA, 1993.

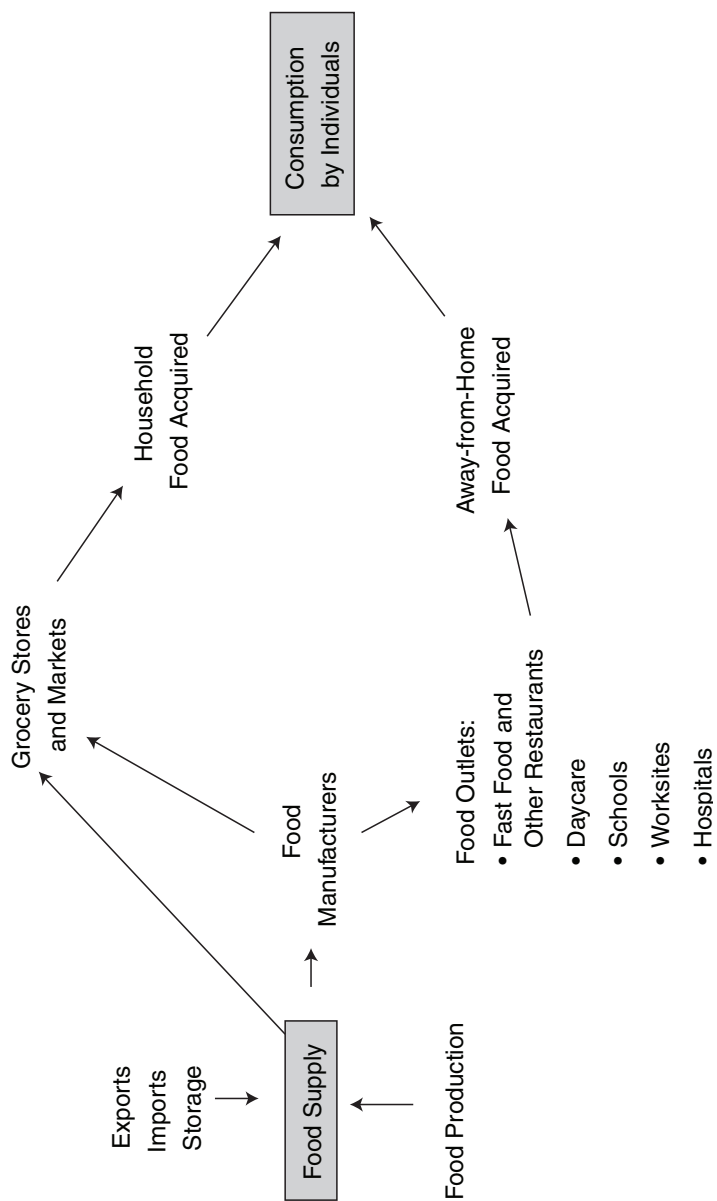


FIGURE 3-4 Flow of foods from the food supply to individual consumption.
SOURCE: Krebs-Smith, 2011.

tant point because characterizing foods at all levels requires databases that reflect these various forms.

Both individual-level surveys and food supply data have evolved in the last couple of decades, and these methodological and database improvements provide lessons for how the food environment might be examined. In the past, researchers reported such findings as, for example, that 6 percent of individuals did not eat any vegetables during a 3-day period, noting, however, that the value reported did not include vegetables eaten as part of food mixtures (i.e., foods containing multiple ingredients, such as a casserole).⁶ Researchers did not have the tools to discriminate in detail, and the only way they could approximate usual intakes was to take a mean across 3 days. Similarly, a finding that all individuals consumed an average of 88 grams of mixtures, mainly meat, poultry, and fish, was of somewhat limited value because there were no dietary recommendations for how many grams of such mixtures individuals should eat.

Responding to these difficulties, nutritionists devised improved ways to capture the intake of specific foods of interest, to estimate usual intake distributions, and to relate this information to caloric density. They also identified some gaps in food-related databases, Krebs-Smith added. Traditional food composition databases provided the amounts of various nutrients and other dietary elements in particular foods that can be determined using chemical analysis, typically in terms of the amount contained in 100 grams of the food. Thus, for example, they listed energy (in kcal), carbohydrates (g), protein (g), beta carotene (IU), calcium (mg), fiber (g), sodium (mg), and fat (g). These data provide valuable information, Krebs-Smith explained, but “don’t tell us everything we need to know about comparing intakes to recommendations.” Guidance-based databases have since been developed that link to dietary recommendations; they measure, for example, cups of fruit, vegetables, or milk (or milk equivalents in the form of cheese or yogurt); ounces of whole grains, total grains, and meat; and teaspoons of added sugars.

Researchers now can measure the prevalence of usual intakes above or below a particular level (Carriquiry, 2003), so they can report, for example, that over the long run, 95 percent of the population consumes an amount of empty calories that exceeds the discretionary calorie allowance in national guidelines. This sort of finding is compelling, Krebs-Smith added. Nutritionists can identify the food sources of empty calories or other elements that

⁶Examples in this paragraph are paraphrased from the *Third Report on Nutrition Monitoring in the United States* (FASEB, 1995).

should be curtailed, and the newer data provided the evidence base for the Dietary Guidelines Advisory Committee's most recent recommendations.⁷

Advances also have occurred in the collection of data on the food supply, Krebs-Smith noted. Here as well, traditional methods produced valuable information, such as pounds of caloric sweeteners consumed per capita in a year, but the implications were not completely clear because there was no guideline as to how many pounds were advisable. Researchers were interested in the issue, as consumption of regular and low-calorie soft drinks climbed from 26 to 44 gallons per capita between 1972 and 1992 (FASEB, 1995), but the data did not translate easily to recommendations. Moreover, measuring quantities of particular commodities in the food supply gives only an approximation of consumption because of losses from food waste.

These measures have now been translated into waste-adjusted servings per person per day, making it easier to assess the food supply's alignment with food guidance, Krebs-Smith explained. Thus, for example, "we know that in order to meet recommendations we'd need to be producing about twice as many fruits and vegetables and much more whole grains and milk." Newer forms of data also have made it possible to project the agricultural needs that will come with population shifts; current growth indicates an even greater need for fruits, vegetables, and whole grains (along with a decrease in the production of caloric sweeteners) by approximately 17 billion pounds in the United States (McNamara et al., 1999). The United States has price and incentive structures in its agricultural policies, Krebs-Smith noted, explaining that farmers are paid not to grow fruits and vegetables on key acreage. In this light, she said, it is interesting to note that the amount of fruits and vegetables in the food supply would be insufficient if everyone wanted to eat according to dietary recommendations.

Researchers also have been able to look across decades to track changes in the quality of the U.S. food supply from 1970 to 2007 (Krebs-Smith et al., 2010). Despite the existence of dietary guidelines, Krebs-Smith explained, little improvement has been seen in the consumption of fruits, vegetables, and grains, and some aspects of the U.S. diet have worsened from a nutritional perspective. Researchers can use tools such as the Healthy Eating Index (a measure developed by U.S. Department of Agriculture's Center for Nutrition Policy and Promotion to monitor the quality of diets in the United States) to assess the nutritional quality of specific menu items at fast-food restaurants and determine relative diet quality, for example.⁸

⁷For more information on the dietary guidelines and the committee that developed them, see <http://www.cnpp.usda.gov/dietaryguidelines.htm>.

⁸For more on the Health Eating Index, see <http://www.cnpp.usda.gov/healthyeatingindex.htm>.

There is a lack of data with which to describe the full array of foods—raw, semiprepared (such as a cake mix or boxed macaroni meal), and ready-to-eat—offered in a grocery store. If more information linked to particular foods were available from the outlets that sell such products, Krebs-Smith explained, researchers could apply an index of diet quality to assess the nature and mix of foods available within a particular area. With more complete data, researchers could also look at, for example, the food consumed by a family over 1 week and assess its quality and nutrition density. More complete food-linked data also would allow for a more detailed assessment of the progress of such initiatives as the Healthy Weight Commitment Foundation, an effort in which food manufacturers and other food-related businesses have pledged to support consumers in reducing obesity by changing their products, packaging, and labeling and reducing the calories in the food supply by 1.5 trillion by the end of 2015.⁹ It would be valuable, Krebs-Smith explained, to look at whether the calorie reduction goal was achieved through limits on empty calories, as opposed to the more valuable calories supplied by fruits, vegetables, and whole grains.

Workshop participants pointed out that each sort of measure entails complications, observing that individuals make errors when responding to surveys in recalling and recording what they have eaten, while imprecise estimates regarding food waste may introduce error in food supply data. Krebs-Smith noted that some accounting of the waste is included in data analysis and emphasized that each data source is important, although more could be done to reconcile discrepancies.

Krebs-Smith closed by showing an altered version of the model depicting the flow of foods from the food supply to the individual (Figure 3-5). Each element is shown in a box to signal the ideal situation, in which measures of each would be available. As the figure shows, however, databases still are needed to provide data for some elements in the model.

If the data were complete, Krebs-Smith observed, it would be possible to describe any environment in which food is marketed, offered, or sold in terms of dietary quality. Interventions designed to reduce obesity or target other health objectives could be evaluated for their effect on dietary quality, and the relationships between diet quality and other factors, within and across levels, could be examined. “We’ve learned a lot by matching our measures and methods to questions of interest, and there is a potential for gaining a lot of new knowledge by doing this at multiple levels,” Krebs-Smith concluded.

⁹For more on the Healthy Weight Commitment Foundation, see <http://www.healthyweightcommit.org/>.

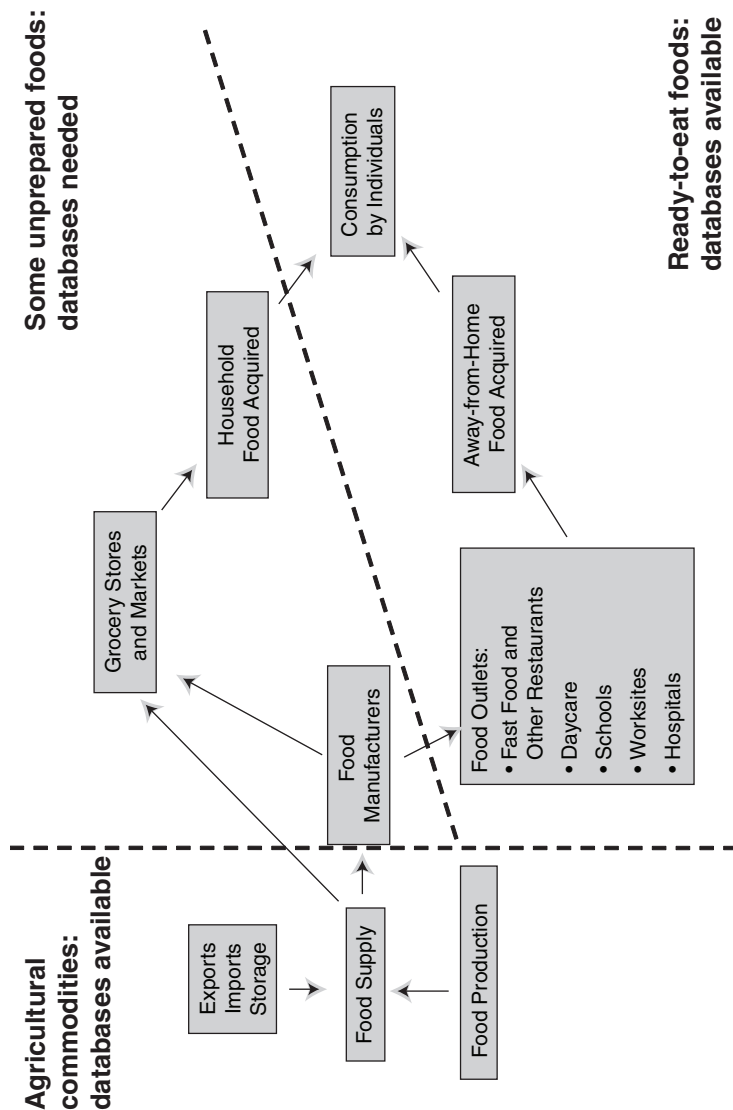


FIGURE 3-5 Diagram showing what an ideal national surveillance system for tracking nutrition-related environmental and policy changes might examine.

NOTE: Shaded boxes indicate what would ideally be measured.

SOURCE: Krebs-Smith, 2011.

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4

Looking Across Domains

Key Points Noted in Presentations

- The National Collaborative on Childhood Obesity Research (NCCOR) is a collaborative effort designed to improve the efficiency, effectiveness, and application of research related to childhood obesity. It has developed new tools for obesity researchers: (1) a Measures Registry—a searchable online registry of diet and physical activity measures at the individual and environmental levels; and (2) a Catalogue of Surveillance Systems—an online directory of national, state, and local data resources available at multiple levels.
- The body mass index (BMI) can be useful in screening to identify those at either an elevated weight for height or a low weight for height, but it is not a precise measure of adiposity and must be interpreted with care. The significance of this ratio is affected by variations in body structure across ethnic groups, growth and development in children and adolescents, and loss of height with aging.
- From one economist’s perspective, the argument that reducing and preventing obesity will save money is not robust. Improvements in measurement and analyses would strengthen the ability to support detailed claims for most interventions. An argument based on cost-effectiveness—taking into account the trade-offs that come with any intervention and focusing on health benefits rather than cost savings—may be more effective.

In addition to measures of the built environment for physical activity and of the food and nutrition environment, there are measures, data resources, and methods that relate to both of these environments and may help researchers and policy makers assess progress in obesity prevention. Robin McKinnon, health policy specialist in the Risk Factor Monitoring and Methods Branch at the National Cancer Institute, described research activities of the National Collaborative on Childhood Obesity Research. Robert Malina, professor emeritus in the Department of Kinesiology and Health Education at the University of Texas, Austin, and research professor in the Department of Kinesiology at Tarleton State University, described research related to growth and BMI. Roland Sturm, senior economist at RAND and professor of policy analysis at the RAND Pardee Graduate School, discussed economic perspectives on nutrition, physical activity, and obesity interventions.

NEW TOOLS FOR CHILDHOOD OBESITY RESEARCH

Presenter: Robin McKinnon

The National Collaborative on Childhood Obesity Research is an effort to enhance coordination of activities related to childhood obesity research.¹ Four of the major funders in this area—the Centers for Disease Control and Prevention (CDC), the National Institutes of Health (NIH), the Robert Wood Johnson Foundation (RWJF), and the U.S. Department of Agriculture (USDA)—joined forces to improve the efficiency, effectiveness, and application of research related to childhood obesity, McKinnon explained. Newly available NCCOR tools are designed to address a range of issues facing researchers interested in childhood obesity, she noted. To make optimal research decisions, researchers need to know, for example, what data resources exist and how to gain access to them, how much they cost, and which variables can be linked across data systems, as well as what measures exist and which ones have been tested for validity and reliability.

NCCOR's priorities include promoting the use of common measures and methods across childhood obesity prevention efforts and research, and encouraging the development of standard measures with which to describe and evaluate interventions, especially projects that address policies and environments, McKinnon explained. NCCOR has produced a new Measures Registry to facilitate access to available measures, identify gaps in measures, and foster the development of new measures. This searchable,

¹For more information about NCCOR, see www.nccor.org (accessed August 26, 2011). NCCOR's Measures Registry is available at www.nccor.org/measures, the Catalogue of Surveillance Systems at www.nccor.org/css.

web-based tool includes nearly 750 measures in four domains: individual dietary behavior, individual physical activity behavior, the food environment, and the physical activity environment. Questionnaires, diaries, logs, electronic devices, and direct observations of people and environments are among the types of measures included.

The Measures Registry provides such information as which domains are measured; validity and reliability; settings, geographic areas, and populations measured; and protocols for use. Measures in the registry focus on individual behaviors and the environments that may affect those behaviors. Information in the registry is based on literature searches, a best-practice review, lists of recommended measures prepared by experts in the areas covered, and a tailored abstraction tool. The registry allows users to search and browse for measures, search for specific details related to those measures, link to other measures and other studies that have been conducted using a particular measure, and find measures that are in development and have not yet been published. Researchers may also submit their own measures for inclusion.

NCCOR also has developed the Catalogue of Surveillance Systems, which is intended to increase awareness and use of existing obesity-related data resources at the individual, household, organizational, community, and macro/policy levels. Knowledge of the broad array of relevant surveillance systems has been limited, given that there has been no easy way to locate these systems. In addition, relatively little research has taken advantage of possibilities for linking data across the spectrum of influences on behavior.

As of the time of the workshop, 77 surveillance systems, providing national, state, and local data, were featured in the catalogue, which is updated continually. Only systems that provide data collected in the United States within the last 10 years and make raw data publicly available (so that researchers can access and manipulate the data for themselves) are included. Extensive reviews are part of the process of selecting systems for inclusion and creating their web-based profiles. Using the catalogue, researchers can search by topic, compare system attributes, and gain access to related resources such as summary statistics or legislative databases. Figure 4-1 illustrates the breadth of the resources represented in the catalogue, superimposed on an ecological model of factors that influence obesity.

NCCOR has plans for sustaining and updating these two resources, McKinnon explained, and for expanding awareness of what they have to offer. She also noted some early feedback that can be used in assessing the measures and data resources featured in the NCCOR tools. Although a wide range of measures already is available, she observed, the degree to which they have been tested for validity and reliability varies considerably. Relatively few surveillance systems include measured height and weight data (instead, most include self-reported data), and very few include objec-

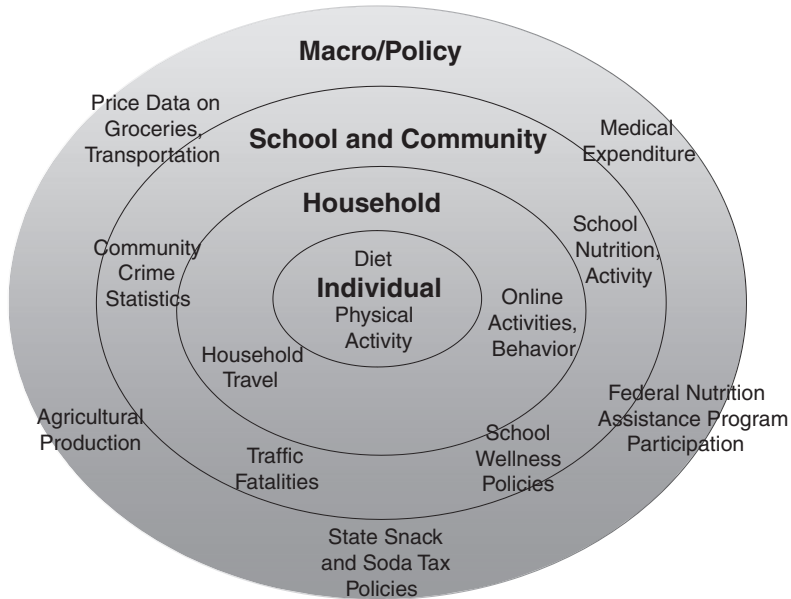


FIGURE 4-1 Example of the breadth of resources or data sets represented within the NCCOR Catalogue of Surveillance Systems, categorized by levels of a social ecological model.

SOURCE: McKinnon, 2011.

tive measures of physical activity. Data from nutrient and food group databases can be linked to individual surveys, but not to surveys of grocery stores or markets. Also, surveillance of obesity-related policies is limited. McKinnon concluded by noting that NCCOR is working to build awareness of resources already available, to identify gaps and priorities for future work, to spur innovation in research, and ultimately to reduce rates of childhood obesity.

BODY MASS INDEX

Presenter: Robert Malina

BMI is the most frequently used measure of individuals' weight status. Malina described its use and a number of related issues. BMI—an index of weight for height—was originally developed by Adolphe Quetelet, a 19th-century sociologist who calculated it in terms of weight in kilograms divided by height in meters squared (it was called the Quetelet Index until the early 1970s). Its primary use is as a screening tool to identify those at

an elevated weight for height or a low weight for height. Current BMI standards for overweight and obesity in the United States are based on weight for height distributions from certain health surveys over a period of time. The World Health Organization (WHO) defines an adult as overweight if his or her BMI is at or above 25 kg/m² and obese if it is at or above 30 kg/m². Children and adolescents in the United States are classified based on growth charts developed by CDC, and are considered overweight if they are between the 85th and 95th percentiles in weight for their age and obese if they are at or above the 95th percentile.

Even these simple calculations, however, raise issues, Malina noted. CDC did not include weight data from the 1988-1994 National Health and Nutrition Examination Survey (NHANES)² in determining overweight and obesity criteria for U.S. growth charts because the gain in weight across surveys was viewed as undesirable from a public health perspective, Malina explained, even though that survey was the first to reveal the obesity epidemic.

In most countries, people use the International Obesity Task Force (IOTF) criteria for overweight and obesity. These criteria were derived from a data set based on six cross-sectional studies that includes U.S. data collected in the 1970s and 1980s—before the obesity epidemic had emerged, Malina noted. As Figures 4-2 and 4-3 show, however, use of these criteria results in significantly different prevalence rates of overweight and particularly of obesity for male (Figure 4-2) and female (Figure 4-3) children and adolescents.

BMI growth rates vary significantly among children, Malina added. At birth children are fairly consistent in size, but they follow their own trajectories as they grow. Based on data for French children, Rolland-Cachera and colleagues (1991) show (Figure 4-4) that there is a rapid rise in BMI from birth to age 1 or 2, followed by a gradual decline into middle childhood. This phase is followed by an “adiposity rebound,” as Rolland-Cachera calls it, which may have important implications for children’s later rates of overweight and obesity. Children who begin this rebound early—before age 5 1/2—are more likely to have a higher BMI in young adulthood than are those who begin the rebound after age 7, said Malina.

Other evidence reinforces this point, Malina explained. Children who are more active at ages 4 to 11 years experience the rebound at later ages and are not as fat in early adolescence as less active children (Moore et al., 2003). Thus, the “rebound” period may be an important window for intervention, Malina suggested. Not only would it potentially be valuable to delay the rebound, but there is also reason to believe that children’s basic

²For more information about NHANES, see <http://www.cdc.gov/nchs/nhanes.htm> (accessed August 2011).

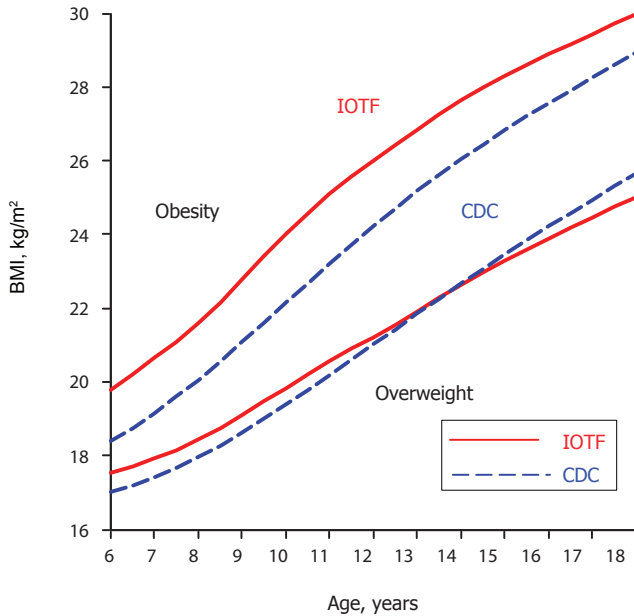


FIGURE 4-2 Differences in overweight and obesity prevalence among male children and adolescents using Centers for Disease Control and Prevention (CDC) criteria versus International Obesity Task Force (IOTF) criteria.

NOTE: Based on CDC percentiles for overweight and obesity and IOTF cut-offs for overweight and obesity.

SOURCE: Malina, 2011.

movement skills are fairly set by age 6 or 7 years, and that obese youngsters have deficiencies in movement coordination that limit their physical activity opportunities as they age. Workshop participants suggested that the best target for intervention might be even earlier if data indicating that very young children who are overweight or obese have significantly increased odds of being so as adults and experiencing the health problems that often come with excess weight.

Greater variation in weight trajectory is evident as children enter adolescence, Malina explained, because of the differential timing of growth spurts. Generally, these spurts affect height first—the legs and then the trunk—and then weight. Girls experience the spurts significantly earlier than do boys, Malina added, but he noted that it is necessary to view data collected across at least 5 or 6 consecutive years of growth to see the patterns. Looking only at maturity indicators, such as stages of puberty, age at menarche, or peak height velocity (the period of fastest growth) is a limited

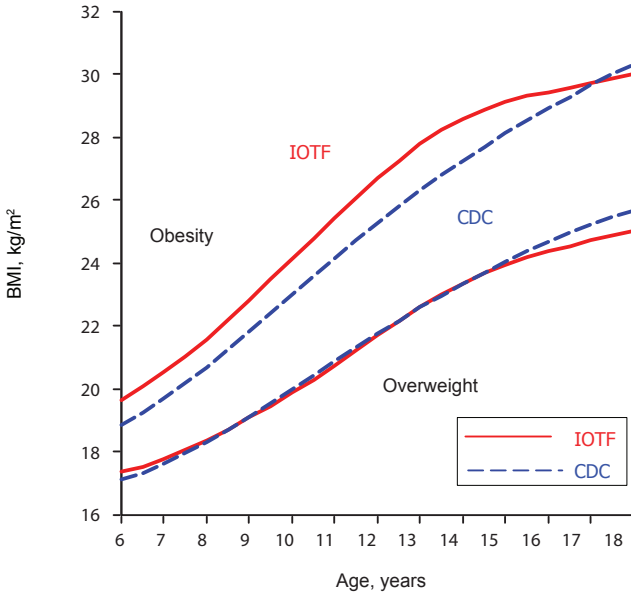


FIGURE 4-3 Differences in overweight and obesity prevalence among female children and adolescents using Centers for Disease Control and Prevention (CDC) criteria versus International Obesity Task Force (IOTF) criteria.

NOTE: Based on CDC percentiles for overweight and obesity and IOTF cut-offs for overweight and obesity.

SOURCE: Malina, 2011.

approach, he noted, because these measures identify discrete milestones or stages that are really part of a continuous process lasting several years. Youngsters reach these stages at a range of ages, and chronological age matters as well. For example, observed Malina, “A post-menarcheal 11 year-old girl is very different from a pre- or post-menarcheal 14 year-old girl.”

The significance of the timing of growth spurts is suggested by findings from the Leuven Growth Study (Beunen et al., 1994). This mixed longitudinal study of boys in Belgium revealed that those who attained their peak height velocity at earlier ages had higher BMIs than those who did so later, and that this difference lasted at least until age 30. Two other studies (Guo et al., 1994; Rolland-Cachera et al., 1991) reinforced the connection between elevated BMI levels during childhood and adolescence and in young adulthood. In particular, Malina noted, study data from Guo and colleagues (1994) showed that youngsters at the higher BMI percentiles (e.g., 75th, 85th, 95th) were most at risk for obesity at age 35.

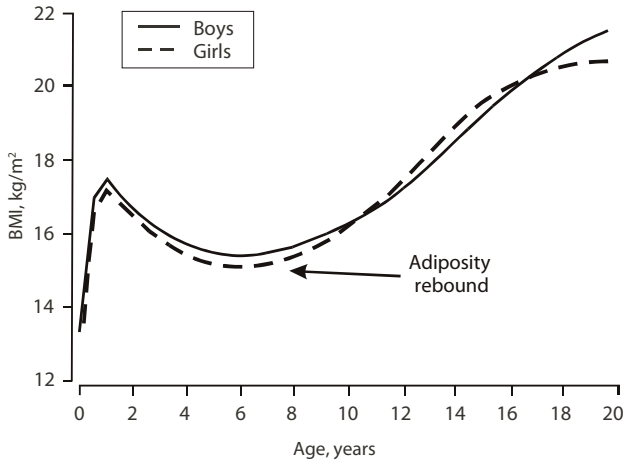


FIGURE 4-4 The rapid rise in BMI from birth to age 1 or 2 years is followed by a decline and then an “adiposity rebound” in middle childhood.

SOURCE: Adapted, with permission, from R. M. Malina, C. Bouchard, and O. Bar-Or, 2004, *Growth, maturation, and physical activity*, 2nd ed. (Champaign, IL: Human Kinetics), 64. Data from M. F. Rolland-Cachera, T. J. Cole, M. Sempe, et al., 1991, “Body mass index variations: Centiles from birth to 87 years,” *European Journal of Clinical Nutrition* 45:13-21.

Also important, Malina observed, is that BMI is an indicator of weight for height, not of fatness. The calculation does not discriminate between lean and fat tissue, and the correlation between BMI and percentage fat varies by individual. BMI is about equally correlated with fat-free mass (lean tissue) and fat mass and percentage fat in youth (Malina and Katzmarzyk, 1999). For men, he added, the correlation between BMI and percentage lean tissue is greater than the correlation between BMI and percentage fat tissue (Romero-Corral et al., 2008). The reverse is true for women, which probably reflects sex differences in the ratio of lean to fat tissue, Malina explained.

Figure 4-5 illustrates the point: the upper right and lower left quadrants on both graphs represent men and women for whom BMI and percentage fat tissue are either both above or both below the target range. The upper left and lower right quadrants on both graphs represent those for whom the two measures do not match. Thus, Malina explained, “something is being missed by the BMI.”

Another issue to consider is that people lose height as they age, a fact that should be taken into account in the interpretation of BMI measures. As data from Sorkin and colleagues (1999) and others show, the decrease usu-

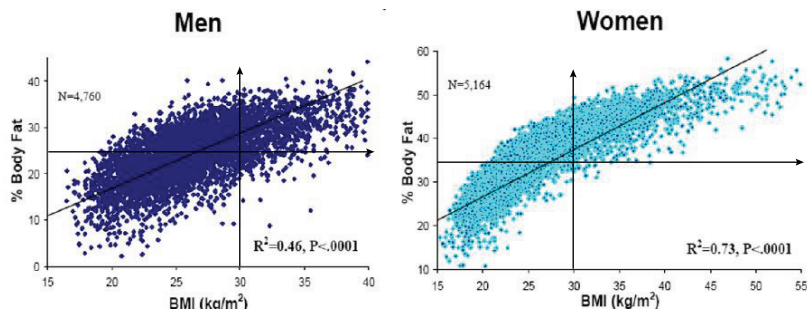


FIGURE 4-5 Age- and race-adjusted correlation between body mass index and body fat percentage for men and women less than 60 years of age.

NOTE: The World Health Organization reference standard for obesity is body fat >25 percent in men and >35 percent in women; the Centers for Disease Control and Prevention defines obesity as BMI ≥ 30 kg/m², as indicated by the arrows in the figure.

SOURCE: Adapted by permission from Macmillan Publishers Ltd: [International Journal of Obesity] Romero-Corral, A., V. K. Somers, J. Sierra-Johnson, R. J. Thomas, M. L. Collazo-Clavell, J. Korinek, T. G. Allison, J. A. Batsis, F. H. Sert-Kuniyoshi, and F. Lopez-Jimenez. "Accuracy of Body Mass Index in Diagnosing Obesity in the Adult General Population." *International Journal of Obesity* 32, no. 6 (2008).

ally begins at age 30 to 35 and accelerates after age 55, with women losing height more rapidly than men. Body composition also varies, on average, among ethnic groups, Malina added. Asian populations, for example, tend to have lower BMIs but higher percentages of body fat than other groups, as well as more abdominal fat at lower BMI levels (Malina, 2005). Thus, WHO has identified different overweight and obesity thresholds for these populations (WHO, 2000). In general, people who are shorter in stature and have shorter legs will have higher BMIs, and the distribution of fat in the body also varies with ethnicity (Malina, 2005; Malina et al., 1995).

These points suggest that BMI may be a less sensitive indicator of health concerns for some populations than for others, Malina observed. A number of observers have suggested that other measures—such as waist circumference, an indicator of abdominal fat (which has the greatest health significance), or ratio of waist circumference to height (e.g., Ardern et al., 2004; Cleeman, 2001; Hsieh et al., 2003)—may be better tools for identifying the presence of excess weight that may be a health concern. However, defining the thresholds for these measures is still complex because of variation by ethnicity and other characteristics, Malina explained. A 0.50 waist-to-height ratio has been proposed as the cut-off between normal and overweight individuals in Japan (Hsieh et al., 2003), he noted, but in

another population, the Zapotec Indians of Oaxaca, Mexico (whom he has studied), who are extremely small in stature, the mean waist-to-height ratio is 0.53, and they “are by no means overweight.”

Malina also noted that recent studies of the correlations among different measures have yielded mixed results (Flegal et al., 2009). BMI, waist circumference, and waist-to-height ratio were more strongly correlated with each other (correlations ranged from 0.85 to 0.97) than with measures of percentage of body fat (correlations ranged from 0.65 to 0.87). From another perspective, the data showed that none of the measures were excellent at classifying individuals as normal, overweight, or obese. For example, BMI correctly classified only 46 percent of men and 49 percent of women, while waist circumference correctly classified 51 percent of men and 42 percent of women (Flegal et al., 2009).

In conclusion, Malina commented that BMI is a useful measure that is easy to calculate and is good for showing trends among populations and subgroups. Because it is affected by growth and pubertal maturation, by aging, and by ethnicity it must be interpreted carefully. Research is needed to monitor BMI rates longitudinally, in Malina’s view, “so we can find out how the BMI changes and what factors affect individual change.” For example, little is known about how sensitive BMI is to physical activity, particularly in youngsters, but BMI could be an important tool for tracking the role of physical activity in preventing unhealthy weight gain.

Several participants agreed that BMI and basic height and weight measures can be valuable tools for screening in schools to identify children and families who could benefit from counseling about nutrition and physical activity (several states currently use such screens, Malina noted). Malina cautioned that the information needs to be interpreted and communicated with care, not only because of the variation in healthy physical proportions among ethnic groups, but also because the information can do more harm than good if individuals draw the wrong conclusions—for example, developing anorexic behaviors because of concern about modest excess weight.

MAKING THE ECONOMIC CASE FOR OBESITY PREVENTION

Presenter: Roland Sturm

Making sustainable progress against obesity requires strong public support. Both economic and public health perspectives play an important role in the policy process, and the interventions supported by both perspectives are most likely to be effective and politically acceptable, Sturm explained. Yet there is a gulf between these two research perspectives, and they often appear to be at odds with each other. “Without understanding the economic perspective,” Sturm suggested, “public health professionals will

have limited influence and sometimes may appear out of touch with public opinion.” Sturm suggested that the reputation of public health experts is that their focus on health status and willingness to intervene if health could be improved may ignore individual preferences and fail to take into account other important goals that people have. When public health messages seem to be too heavy-handed or out of touch with majority opinion, the messages of industry lobbyists seem more reasonable. “They know how to play the game,” he added, expressing his view that “they resonate with the public” and are talented at communication.

From an economic point of view, health (and even more so a healthy diet or physical activity) is just one of many competing goals that people must reconcile in their daily lives. In contrast to a public health perspective in which decisions are made by experts, an economic perspective tackles questions with the assumption that people can and do make their own decisions, Sturm said. In the United States, more than in most other countries, the belief in consumer sovereignty has a strong influence and affects how institutions work. Long-standing federal guidelines, for example, require agencies to identify market failures (i.e., situations where market forces by themselves cannot achieve desirable outcomes) before issuing regulations. Moreover, considering benefits and costs, as well as their distribution, is important in deciding what interventions might be valid and useful. Thus, Sturm explained, interventions are most likely to be successful and politically sustainable when public health and economic perspectives are integrated.

Cost-effectiveness or cost-utility analysis is applicable to obesity prevention, Sturm explained, because the goal is to improve health in an optimal way, given constrained resources. In this sort of analysis, economists prefer to quantify outcomes using natural units, which in this instance might be cases of obesity or disease prevented, or life-years saved, perhaps accounting also for years of disability saved. Since the field may not readily produce those units, a more general measure is used, such as morbidity and mortality rates. Economists also strive to account honestly for all costs of an intervention, and Sturm stressed that when this is not done, the credibility of the analysis is undermined, and the result is likely to polarize the debate further rather than broaden support for the intervention. Obesity prevention efforts cost money, and making a strong case for such efforts requires more than saying they improve health, Sturm observed. Nor should we make promises that may not be fulfilled, he said. He shared his belief that from an empirical point of view, the claim that money could be saved is almost certainly wrong, saying that prevention improves health but “almost never saves costs.” Of course, obesity is associated with higher health care costs, and preventing obesity would avoid these excess expenditures, which are about one-third higher among obese than nonobese individuals

and even double among those with a BMI more than 40 (Andreyeva et al., 2004; Sturm, 2002). Yet Sturm posed the question of whether there would actually be cost savings after intervention costs were taken into account. He noted that promises of such savings have been made in other areas and reliably failed to materialize on a larger scale (Sturm, 2001). In his view, however, an even larger conceptual flaw is involved in trying to justify obesity prevention with an offset in medical costs. If reducing costs were the true goal, he observed, eliminating doctors and hospitals—or increasing smoking, which could lead to earlier deaths and thus save the costs of Social Security pensions and Medicare—would be a surer way to accomplish that goal.

Sturm summarized his points by explaining that cost-effective is not the same as cost savings. Cost-effective means “good value for the resources compared to alternative interventions or policies,” he said, reiterating his belief that cost savings are unlikely to exist for many obesity interventions.

Turning next to the sorts of evidence he believes would be useful in developing an approach to obesity prevention, Sturm described a review of behavioral physical activity interventions. Wu and colleagues (2011) identified 91 such interventions for which there was evidence of effectiveness and for which cost information was available. They calculated cost-effectiveness ratios for these interventions and found that the ratios ranged from \$0.001 to \$60 per MET³ hour. They found that the most cost-effective interventions were also the least expensive per individual reached, but also had only “tiny” absolute effects. The least cost-effective interventions were those that provided some type of social support as part of an effort to promote behavior change in individuals. If we could take those published estimates at face value, Sturm said, they would provide exactly the information needed to develop the most cost-effective obesity prevention interventions. Unfortunately, while this is the direction research should pursue more intensively, the research field is not yet at this point, Sturm noted. One indication is the wide range of cost-effectiveness among interventions designed to improve access to opportunities for physical activity or community-wide health campaigns. To further illustrate his point, Sturm analyzed the quality of 136 studies of physical activity interventions cited in the appendix of the systematic review by Wu and colleagues (2011) and compared the effects reported. After controlling for such factors as whether the study was a randomized trial, length of follow-up, and degree of attrition, he found that

³MET = metabolic equivalent of the task. One MET hour is the equivalent of the energy expended by the body during 1 hour of rest and is standardized based on body weight. Several MET hours of exercise can be accumulated during 1 “real-time” hour; for example, 1 hour of moderate walking is approximately equal to 3 MET hours (http://www.johnshopkinshealthalerts.com/alerts/healthy_living/JohnsHopkinsHealthyLivingHealthAlert_1821-1.html; <http://mbsrunner.com/mtp/Forms/glossaryreg.aspx>).

the lower the quality of the evaluation, the lower was the cost-effectiveness ratio (dollars per increase in activity) that was found. In other words, the most positive results came from the weakest studies.

At present, Sturm noted, no single study provides sufficient information to support cost-effectiveness analysis for many of the most common policy suggestions, such as food taxes, advertising bans, or fast-food bans. An alternative is to use modeling or simulation approaches (e.g., Levy et al., 2011). However, these approaches are still in the developmental stage. The best example to date is the Australia Assessing Cost-Effectiveness in Obesity (ACE-Obesity) project, which has produced a number of publications (e.g., Magnus et al., 2009; Moodie et al., 2009, 2010; Sacks et al., 2011). ACE-Obesity uses a speculative measure of health outcomes, and more reliable estimates of effectiveness are needed for this work to inform policy, Sturm said. Noting that the general approach is promising, he discussed a few of that project's findings. Traffic-light nutrition labeling (an approach used in Australia and the United Kingdom, in which red, yellow, and green color symbols indicate foods that are unhealthy, okay occasionally, and healthy) and junk food taxes appeared to be highly cost-effective (Sacks et al., 2011), although Sturm noted that some of the underlying assumptions used in these studies are questionable. Removing television advertising for unhealthy foods also appeared to be highly cost-effective among Australian children (Magnus et al., 2009).

The picture is similar for cost-effectiveness analysis of the built environment, Sturm explained. The methodology of the available studies varies significantly, limiting the conclusions that can be drawn (Feng et al., 2010). In Sturm's view, the findings that are frequently cited in public debate have been "cherry-picked and are likely to dramatically overstate possible outcomes." Further, the details of some interventions under discussion (e.g., increasing the number of supermarkets in underserved areas) are not sufficient for costs to be calculated.

The rate of false published research results is high in new and competitive research topics that are still "quite experimental," in Sturm's view. This does not mean that this research area is inherently flawed, but rather that more systematic research is needed. It is a well-documented phenomenon in new fields that some initial results do not hold up when replicated, Sturm said, citing as an example findings that there are genetic markers for obesity and diabetes, which could not be replicated (Redden and Allison, 2003). The key to improving policy recommendations is to accelerate this "shake down" phase in the obesity prevention area through systematic replications, he suggested.

"[Publication] biases may be amplified in the [policy process]," Sturm added. Policy makers have a natural tendency to use the most convenient data. Cohen and colleagues (2010, p. 88) write, "it may be politically more

expedient to promote an increase in consumption of healthy items rather than a decrease in consumption of unhealthy items, but it may be far less effective.”

Sturm offered several recommendations for identifying more efficient and sustainable means of preventing and reducing obesity:

- Integrating economic perspectives with public health goals—specifically, taking into account the many trade-offs involved in such decisions—will help to minimize ideological battles and build broader support for interventions.
- Sturm urged policy makers and others to make an argument based on health benefits and avoid using the argument that an intervention will save money, stating his opinion that the latter argument is “not credible, conceptually flawed, and likely to be counterproductive.”
- Sturm also argued that cost-effectiveness estimates for obesity prevention measures need further development and are most suitable at this stage for identifying broad classes of interventions that are more or less cost-effective. It is difficult to conduct more detailed comparisons of cost-effectiveness with currently available data. Modeling and simulation are more usable now, Sturm added, although even these approaches are in the early stages of development.
- It is important to avoid exaggerating the findings from early research. Emerging areas of investigation commonly yield high rates of false positives and overestimates of effects, and such results are often not replicated in later studies. “This is a good, healthy process,” Sturm explained. “We just have to watch out for it.”
- At the same time, replication is important, Sturm added. Promising results from early studies need to be tested with different data sets. It can be difficult to secure funders for replication studies, but policy makers need these possibly less visible, second-round studies if they are to have reliable and credible data.
- Sturm urged the field to “keep a diversified portfolio.” At present, the evidence is not strong enough to support dedicating major investments in particular areas, and doing so would likely squeeze out less ambitious but possibly more promising interventions.

Participants had a number of comments and questions about Sturm’s perspective. One suggested that the logical implication of his view is that if there is no clear evidence that reducing obesity rates saves money, there must not be a problem, asking “Why don’t we all just be fat and not worry about it?” Others shared this concern, noting, for example, that the diseases

(such as heart disease and diabetes) that account for 80 percent of health care costs in the United States are all obesity related. They questioned how it then could be possible that investing resources in reducing obesity is not cost-effective.

Sturm reiterated his basic argument that “we don’t have doctors to save medical costs; we have doctors to improve health care.” Acknowledging the importance of this point, a participant suggested that members of the health community turn to cost arguments because they do not know how to frame the potentially stronger arguments about the intrinsic value of improving health outcomes. But she lamented that the economists’ perspective does not appear to offer a way to bolster the health argument. Another participant agreed that it is difficult to make the case for interventions because while they can be demonstrated to work, people tend to revert to their former behaviors as soon as an intervention stops. Convincing people to believe in interventions designed not only to reduce but also to prevent obesity is thus very challenging. Another participant observed that the argument could be taken as more about messaging than about economics. Sturm closed with the observation that “we want to maximize health benefits,” but resources are limited. Ideally, cost-effectiveness analyses would support optimal decisions, but “we need to make them better,” he said.

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5

Assessing the Impact of Marketing and Industry

Key Points Noted in Presentations

- Children and adolescents are exposed to a large number of televised food and beverage advertisements each day—by one measure, 12 per day for the youngest children, 21 for 8- to 12-year-olds, and 17 for teenagers. All age groups receive dramatically less exposure to public service announcements about fitness or nutrition.
- There is an array of data, both commercial and public, on foods and beverages sold in the United States, where they can be purchased, and their nutritional characteristics. Researchers can gain the clearest picture of the food supply by integrating different types of data, but gaps remain.
- Assessing the impact of large-scale communication and social marketing campaigns is challenging because they have varying goals and strategies, and because the circumstances in which they operate, as well as the behaviors of people, are constantly evolving. Nonetheless, a number of designs other than randomized controlled trials can be used for evaluating the effects of such campaigns.

The available research suggests many ways in which marketing and industry may influence both what and how much people eat and the

amount of physical activity in which they engage. Food and beverage companies and marketers also are a source of valuable information about what is consumed. Victoria Rideout, president and founder of VJR Consulting, described research on children's exposure to media and advertising and how it relates to obesity. Shu Wen Ng, research assistant professor at the University of North Carolina at Chapel Hill, Gillings School of Global Public Health, discussed available data sources on the food supply in the United States. Robert Hornik, Wilbur Schramm professor of communication and health policy at the University of Pennsylvania Annenberg School for Communication, discussed the evaluation of large-scale public health communication and social marketing programs.

CHILDREN, MEDIA, AND ADVERTISING

Presenter: Victoria Rideout

Two recent studies conducted by the Kaiser Family Foundation¹ explored media influences on obesity in children, Rideout explained. One, *Generation M2: Media in the Lives of 8 to 18 Year-Olds*, focused on the amount of time children spend with media (Rideout et al., 2010). Time spent with media has been linked to obesity because (1) media use is a largely sedentary activity, (2) it exposes children to food marketing, and (3) snacking during media use can contribute to weight gain. The other study, *Food for Thought: Television Food Advertising to Children in the United States*, explores children's exposure to food and beverage advertising on television (Gantz et al., 2007). For both studies, the researchers used a randomly selected, nationally representative sample of school-aged children and adolescents.

Media Use and Exposure

There is a great deal of debate about the best way to measure media use, Rideout noted. The media study cited above (Rideout et al., 2010) did not draw on commercial data sources, although the Nielsen television ratings and other commercial sources can supply valuable information. Commercial data sources are expensive to use, Rideout noted, and some firms that collect data are unwilling to share with academic and public health researchers the data they make available to industry groups. Because commercial data collection focuses on television viewing and website traf-

¹The Kaiser Family Foundation is a nonprofit foundation focused on health policy and communications that conducts its own research. For more information, see <http://www.kff.org/> (accessed August 2011).

fic, these data would also be incomplete for research including the use of other types of media. For this study, Rideout explained, rather than asking respondents how much time they spend in a typical day doing various activities, the researchers asked respondents to focus on television watching and other media activities in which they had engaged the previous day. The study was conducted over a 10-year period in three waves, each with a different sample, to track changes over time. Figures 5-1 through 5-4 show some of the findings.

Figure 5-1 shows the amount of time young people aged 8 to 18 spent with each medium in a typical day, on average. For the average youngster, Rideout observed, the total media exposure—or combined total time spent with each medium—was 10 hours, 45 minutes in 2009. Figure 5-2 shows how that total has increased since the study began, in 1999.

Figure 5-1 also illustrates how important television remains, Rideout noted, despite declines in live television viewing, although several changes are important to note. Total consumption has increased in part because of the “proliferation of media platforms in the home and in the bedroom,” Rideout observed. “There are so many new ways to multitask [but] mobile media is really the biggest change—it has opened up parts of the day” for media uses that were not possible before, such as on the school bus. The

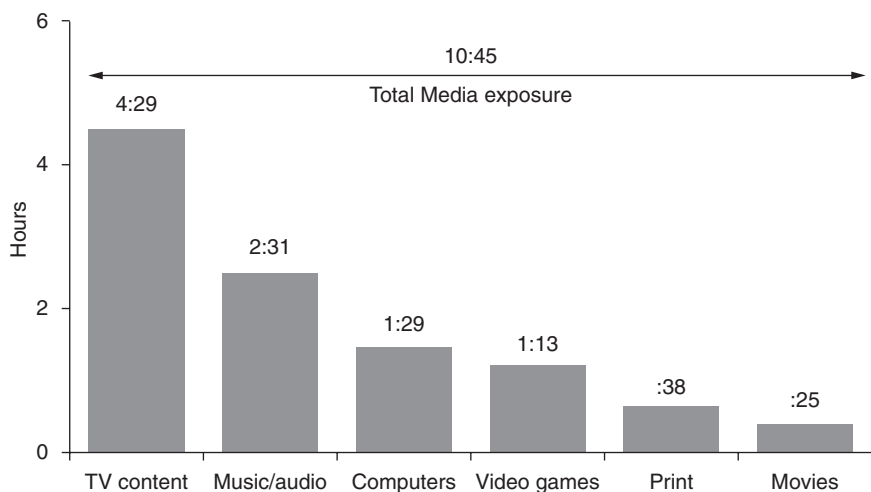


FIGURE 5-1 Amount of time 8- to 18-year-olds spent with various media in a typical day in 2009.

SOURCE: Rideout et al., 2010.

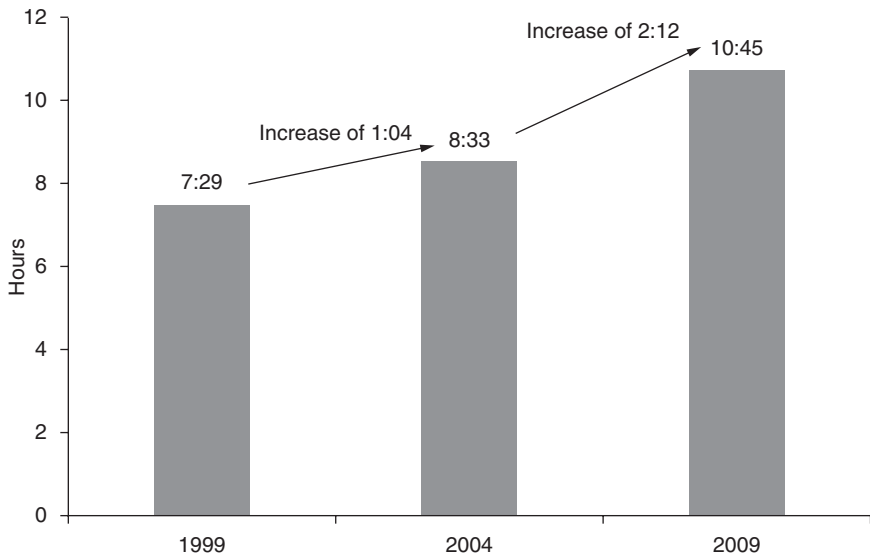


FIGURE 5-2 Increases over time in the total amount of media exposure for 8- to 18-year-olds in a typical day, 1999 to 2009.

SOURCE: Rideout et al., 2010.

study results suggest that 29 percent of the total media exposure in 2009 (10 hours, 45 minutes) was spent multitasking, meaning that the actual time spent using media each day was 7 hours, 38 minutes.

Figures 5-3 and 5-4 show how the exposure totals vary by age and ethnicity, respectively. There is “a big jump when kids hit the tween and teen years,” Rideout commented. She suggested that this is an important point to consider because voluntary policies that govern food and beverage advertising focus on children aged 12 and under. Black and Hispanic children also have significantly higher media use and exposure than their white peers, an observation that is important both because of exposure to advertising and because of the time spent in sedentary activities.

Discerning how the levels of media use relate to physical activity is difficult, Rideout explained, because the media-use measures fail to capture the other activities in which children and adolescents may be engaged at the same time that they are using media. For example, some video games engage the user in physical activity, and young people may be listening to music while working out or have the television on in the background while performing low-level physical activities at home. Because of widespread concern that a great deal of media use is primarily sedentary and is displacing physical activity, the researchers also collected data on physical activity.

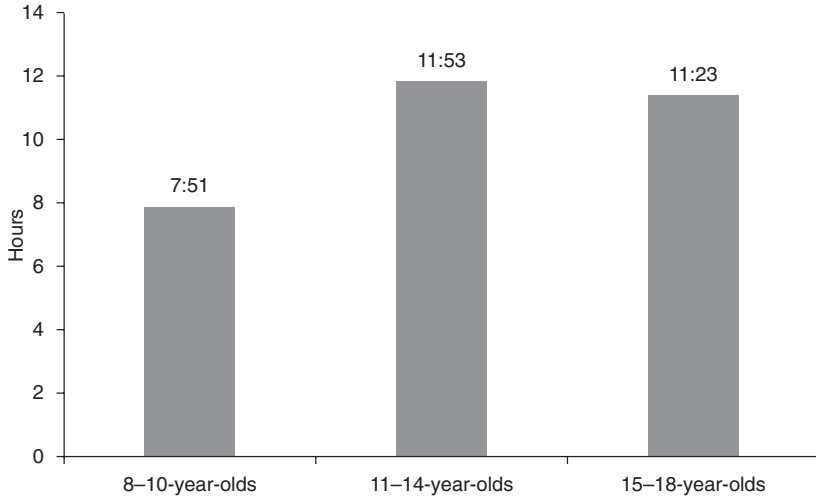


FIGURE 5-3 Total amount of media exposure in a typical day for various age groups, 2009.

SOURCE: Adapted by the author from “Report: Generation M2: Media in the Lives of 8- to 18-Year-Olds,” (#8010), The Henry J. Kaiser Family Foundation, January 2010.

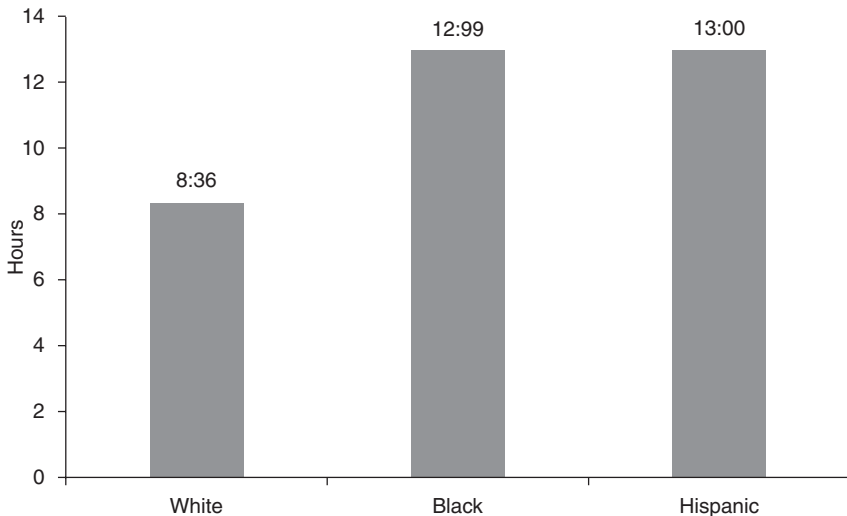


FIGURE 5-4 Total amount of media exposure for 8- to 18-year-olds in a typical day, by race/ethnicity.

SOURCE: Adapted by the author from “Report: Generation M2: Media in the Lives of 8- to 18-Year-Olds,” (#8010), The Henry J. Kaiser Family Foundation, January 2010.

They compared these data with media use, separating respondents into three groups corresponding to low, moderate, and heavy media use. They found no variation among the groups in the amount of physical activity in which they engaged on a typical day. Rideout noted that in the five large studies of media use she has conducted, she has never found a relationship between time spent using media and time spent in physical activity. This finding has been “surprising, but consistent,” she noted, although she added that the measures of physical activity were not very precise: respondents reported how much time they had spent the previous day on such activities as exercise, sports, and dancing, and it is possible that lower-level physical activities differ between heavy and light media users.

Food and Beverage Advertising

For the study of food advertising on television (Gantz et al., 2007), the researchers decided not to use commercial data. In this case, Rideout noted, commercial data can provide raw information, such as the number of advertisements in a certain category that ran in a particular time period. At the time this study was conducted, however, these commercial services did not allow the researchers to view the ads and code their content. Many other studies, she added, have taken a sample of children’s television programming and counted the number of food advertisements that are aired during that programming. For the Kaiser study, she explained, the researchers performed a content analysis of all the programming and advertisements (not just children’s programming) seen by young people in three age groups and compared those data with information about viewing habits. This approach enabled them to determine how much of the viewing time was spent on children’s programming and how much on other programming (as well as how much on noncommercial programming), and thus to obtain a more detailed picture of the children’s advertising exposure. Some of the study results are shown in Table 5-1. In response to a question, Rideout noted that product placement and story lines that address obesity-related issues add to the messaging received by children and adolescents. However, this issue has not yet been systematically studied.

In response to a request from committee members for an analysis of children’s exposure to advertising for sedentary activities, Rideout noted that the largest category of advertising for all age groups was television promotions (advertisements for future broadcasts), which, she suggested, are essentially ads for a sedentary activity. Another major category was advertising for other media products.

In addition, children and adolescents are exposed to a substantial amount of food and beverage advertising each day. At the time these results were collected (2005), Rideout explained, these data translated into 12 food

TABLE 5-1 Annual Exposure to Advertisements, Public Service Announcements (PSAs), and Television Promotions by Age Group, 2005

	Age Group		
	2- to 7- Year-Olds	8- to 12- Year-Olds	13- to 17- Year-Olds
Television promotions	5,765	8,407	6,977
Food advertising	4,427	7,609	6,098
Media ads	2,280	5,046	4,866
Communications	456	1,462	1,676
Toys	597	620	196
Fitness ads	61	163	174
PSAs on fitness or nutrition	164	158	47

SOURCE: Gantz et al., 2007.

and beverage ads per day for the youngest children, 21 for 8- to 12-year-olds, and 17 for teenagers. The study also documented children's exposure to public service announcements (PSAs) on fitness or nutrition. Over the course of a year, adolescents, on average, saw 25 minutes of public health messages on either fitness or nutrition and 40 hours of food and beverage advertising. Children aged 8 to 12 were exposed to 1 hour, 15 minutes of PSAs on fitness or nutrition, compared with 50 hours of food and beverage advertising. Rideout also noted that the number of PSAs likely is lower now because the data were collected while a major public health campaign was under way.

Several workshop participants agreed that this amount of media use and exposure to advertising clearly has a considerable influence on children and adolescents. As one committee member observed, researchers have as yet been unable to tackle the problem of understanding “the full impact of the integrated whole—from billboards to TV to ‘advergames’ to modeling of consumption by parents—but it is likely to be much greater than the sum of its parts.”

MEASURING THE FOOD SUPPLY

Presenter: Shu Wen Ng

Discussion of the food environment in Chapter 3 suggests the important role of the food industry in determining the kinds of food and beverages available around the country. Ng focused in greater detail on the data available on the food supply. First, she noted that foods and beverages fall into three broad categories: unpackaged raw and perishable foods; packaged processed foods; and prepared, completed dishes or meals. These

TABLE 5-2 Locations for Purchase and Consumption of Food and Beverages

	Categories of Foods and Beverages		
	Raw and Perishable	Packaged and Processed	Prepared
Locations of Purchase	Grocery, supermarket, tienda, farmer's market, cafeteria	Grocery, supermarket, tienda, convenience store, vending machine	Quick-service restaurant, full-service restaurant, grocery, cafeteria (school, work)
Locations of Consumption	Home, cafeteria	Grocery, cafeteria, on the go, school, workplace, home	Quick-service restaurant, full-service restaurant, grocery, cafeteria (school, work), on the go, home

SOURCE: Ng, 2011.

products are purchased and consumed in different places, as shown in Table 5-2. This basic structure is important for understanding what is captured by the various sources of data available, Ng noted.

There is an array of public data on these three food categories, Ng explained. One is the National Health and Nutrition Examination Survey (NHANES),² which collects information on the foods people report consuming. The U.S. Department of Agriculture (USDA) has developed 7,500 unique food codes that are used to classify this information; Ng noted that only about 5,700 of the categories were reported in NHANES 2007-2008. For each of these food codes, USDA has calculated the content for more than 60 nutrients per 100 grams of the food, so, Ng observed, “in theory we can figure out a lot about what nutrients we are getting.”

There are also sources of commercial data, Ng explained, that focus on food sales. The universal product codes (UPCs) that are scanned at the cash register in most places that sell packaged foods provide considerable data. There are 600,000 unique UPCs, but Ng noted that many are for multiple packaging options for the same product; in reality, then, there are approximately 200,000 uniquely formulated food and beverage items. For these items, nutritional information is limited to what is included on the nutrition facts label and the ingredients list. Ng mentioned that price lookup codes (PLUs) (numerical codes for produce that are used to streamline checkout and inventory) can be matched to USDA's nutrition data if the produce

²For more information on NHANES, see <http://www.cdc.gov/nchs/nhanes.htm> (accessed August 2011).

was purchased at a supermarket, but that products purchased at farmer's markets, for example, are not captured.

Disconnects exist between the public and commercial data, Ng explained. Meshing USDA's 7,500 food codes with the 200,000 unique formulations poses a challenge, and the public data provide significantly more detailed nutrition information. If one considers a specific set of foods—even something as simple as a peanut butter sandwich—the challenge is evident. The NHANES data have generic codes for whole wheat bread and for peanut butter, whereas the commercial codes identify specific brands and types (e.g., reduced-fat, creamy peanut butter), which may vary significantly in their nutritional content. Moreover, manufacturers and retailers continually make changes to products, so the UPCs or the existing nutritional information for a particular UPC may quickly become outdated.

Researchers are likely to need both public and commercial data, Ng explained, in part because of the limitations of publically available data. Sample sizes for these data are sometimes too small to support conclusions, and sample designs are sometimes limited. Moreover, these data often are based on self-reported dietary recall for the past 1 or 2 days, which may be inaccurate because of recall bias or underreporting, and they usually are subject to a considerable lag time—approximately 2 years for NHANES data. Many academic economists and researchers at marketing and business schools, food research programs, and USDA have begun using commercial data to supplement the public data, Ng noted. However, commercial data are not retained indefinitely, so researchers need to be sure how long they will be available to work with, Ng added.

Compared with public data, commercial data tend to have larger sub-population sample sizes and to better represent usual intake, Ng explained. In many cases, such data provide greater detail in terms of the units of observation (which include individuals, households, stores, markets, and the nation); geographic areas (which include counties, states, markets, and the nation); and time (data are often available on a weekly, 4-weekly, quarterly, and annual basis).

There are several sources of commercial data, Ng explained, obtained mainly through UPC scans. Three frequently used food purchase data sets based on UPC data in the United States are the Nielsen Scantrack, SymphonyIRI Total Store Advantage, and the Nielsen Homescan. These data sets provide information such as

- point-of-sale data, which indicate sales (in total volume and dollars) for food and beverage products by week and year at different sorts of establishments, and can also show how sales fluctuate in response to product promotions, changes to in-store displays, or price changes (Nielsen Scantrack and SymphonyIRI); and

- household panel scanner data, which indicate household purchases of food and beverage products for each shopping occasion, including information about promotions and prices (Nielsen Homescan).

Other commercial sources, such as the Gladson Nutrient Database and the Mintel Global New Product Database, may provide nutrition data for packaged food, that is, label information associated with the UPC, including the nutrition facts panel and ingredients list.

Nonetheless, commercial data have limitations, Ng explained. One limitation is that the data generally do not cover sales at major food outlets, such as big-box and discount club or warehouse stores, or sales from vending machines or food-service locations such as cafeterias and restaurants. Furthermore, the data sets are not always updated comprehensively, and values (such as those on the nutrition facts panel) are typically rounded—both of which can affect the accuracy of the information. Prior data often are overwritten when new data become available, and so may not be accessible to researchers. Obtaining access to commercial data generally is more expensive than obtaining access to public data, and researchers cannot always gain access to the data or to full information regarding the sampling frame used to collect them.

Making optimal use of both public and commercial data requires care, Ng explained. For example, she and her colleagues are developing a bridge between UPCs and USDA food codes so they can compare changes in calories sold and purchased with reports of calories consumed over time and use commercial nutrition data to update the USDA food composition data. Their goal is to weight the data by portion of sales so that USDA food composition data will be more representative of the changing food supply. For this approach to be useful, Ng added, the data will be updated regularly and must be cross-validated using trend analyses to determine whether the findings are consistent.

In Ng's view, drawing on commercial data and integrating them with public data where possible is important for several reasons. First, as noted by others, she believes that "what gets measured, gets changed" (Chriqui et al., 2011). She also believes that such data integration can promote a clearer understanding of the food supply and thus also promote self-regulation by food manufacturers, retailers, and food service companies. Integration also may encourage marketing companies to collect data that may be useful for public health research.

Even with integrated data, however, researchers lack information about foods without UPCs and those eaten in restaurants and cafeterias or obtained from concessions and vending machines. Ng noted in answer to a question that a few sources of data about foods eaten away from home rely on surveys and purchase receipts, but it is not easy to obtain a com-

prehensive picture of this category of consumption. Moreover, researchers do not control—and do not always have information about—the sampling frames used in commercial data collection. Nevertheless, in Ng’s view it is necessary to draw on both public and commercial data to obtain the clearest picture of the food supply.³

EVALUATING LARGE-SCALE COMMUNICATION AND SOCIAL MARKETING PROGRAMS

Presenter: Robert C. Hornik

Advocates and researchers are interested in how media can be used to inform the public about health issues and influence people to make healthier choices. They recognize the importance of evaluating interventions that make use of media messages to understand their relative effectiveness. Many view randomized controlled trials as the optimal way to conduct such evaluations, Hornik explained, but in his view these trials are not always the gold standard for evaluating large-scale communication and social marketing programs.

To explain, Hornik began with an overview of the three primary ways social marketing programs work. Some are designed to influence individuals to change their views and behaviors using some sort of persuasive content. To evaluate these programs, it would be necessary to compare individuals who were or were not exposed to the content (or had more or less exposure). Other programs operate through a social path, with the expectation that people who are directly exposed to the intervention will share that experience in some way with others, who in turn will make changes. To assess such an effect it is necessary to compare social networks that have and have not been exposed to the intervention. A third path of effect is through institutions—where, for example, communication interventions convince school officials to change vending machine policies or manufacturers to change the formulations of food products that influence consumer behavior. When this is the intended path of effect, it is necessary to compare communities.

Given these complex paths through which interventions may operate, evaluators face a difficult practical task, Hornik explained. A great deal of information about food and nutrition and physical activity is being transmitted through both public health messages and regular media cover-

³Ng mentioned several resources for those interested in commercial food and beverage data: the National Collaborative on Childhood Obesity Research (NCCOR) Catalogue of Surveillance Systems (described in Chapter 4), the University of Chicago Kilts Center for Marketing, and the USDA Economic Research Service.

age. Individuals, groups, and institutions are exposed, and because effects from any of these messages may operate at all three levels, evaluation that often focuses on comparing change in individuals may miss important effects. Another complication for randomized controlled trials is that changes resulting from public health messages generally are expected to occur slowly: it may take years for a significant change to be evident, and the changes in a single year are likely to be very small, Hornik added. For example, the single most successful public health effort in the United States has been the campaign against smoking. Over time this campaign led to major changes in behavior. However, noted Hornik, if these changes were examined year to year—when they were on the order of 1-2 percent per year—using samples powered only to find large changes, the success of the campaign would not have been evident. In Hornik's view, randomized controlled trials are better suited to detect large, quick changes, but small, slow changes can be important as well.

Another issue is that social marketing campaigns are not fixed in the same way as drug or vaccine trials. "What we are really talking about here is a process for evolving an intervention," Hornik observed. Those responsible for the intervention are constantly monitoring the way people are responding to it, and they adapt the message accordingly. It is difficult to conduct a randomized trial under these conditions, noted Hornik. In many cases, moreover, it is politically unacceptable to attempt a pure randomized controlled trial. For example, Hornik participated in the evaluation of the U.S. national anti-drug campaign, a case in which having some areas purposely not receiving the anti-drug messages was not acceptable to those responsible for conducting the campaign.

The central problem, in Hornik's view, is that randomized controlled trials "risk getting a very good answer to the wrong question." If the study design requires controlling for many sources of variation, it may limit the natural diffusion of the message. For example, to ensure that some communities are not exposed to a particular message, "we may not allow Oprah to talk about the issue. Or allow the national media to work as it normally does in picking up messages and distributing them broadly." So, in effect, one would intentionally have to do a poor job of social marketing in order to be able to control diffusion of the message.

Hornik described alternatives to randomized controlled trials. One such design is a long-term cohort study, which was used for the National Youth Anti-Drug Media Campaign. To evaluate this program, researchers followed a cohort of youth over an approximately 4-year period and used evidence of their degree of early or ongoing exposure to the campaign to try to predict whether they showed change on selected outcomes (Hornik et al., 2008). The outcomes included attitudes and beliefs about drugs and intentions to use drugs. A similar design was used to analyze the effects

of the VERB™ physical activity campaign, where researchers also tried to determine whether early exposure to an intervention predicted change over time (Huhman et al., 2007). In both cases, it was necessary to have large sample cohorts, Hornik noted, which made the studies expensive to conduct. Thus, he observed, this design may be most suitable for case in which the social marketing program has well-defined and stable expected outcomes and the resources necessary to follow representative samples over a period of years.

Another option is geographic cross-community comparisons, which have been used to evaluate a number of anti-smoking campaigns. Researchers using this approach try to identify planned or naturally occurring variation in exposure to particular messages to see whether it predicts varied outcomes. For example, Wakefield and colleagues (2008) conducted several studies comparing media markets that had high volumes of anti-smoking commercials with other markets that had lower volumes to see whether there was a relationship with rates of smoking. In another study, Farrelly and colleagues (2009) used the same approach to examine the effects of positive images of smoking in the media; they compared gross ratings points (GRPs)⁴ purchased for the truth® campaign by media market and found an association between GRPs purchased and less smoking among youth at the media market level. This sort of design, Hornik noted, is appropriate when roughly comparable media markets are likely to have received different levels of exposure to a message, so one can make a case that the differential exposure is the only difference between them that can reasonably account for different outcomes.

Interrupted time series studies are another option, Hornik noted. In this type of study, observations are collected at multiple points before and after a campaign (the “interruption”) is introduced, and researchers look for evidence of a marked change in the rate of a particular behavioral outcome associated with the campaign. The data are used to establish that there is no other likely explanation for the change, Hornik explained. Such studies are useful when the timing of a campaign is precise, and it is designed to cause a sharp change. Examples include evaluations of an anti-drug campaign in Kentucky (Palmgreen et al., 2002), the Click It or Ticket seatbelt use campaign in North Carolina (Williams et al., 2002), and a vasectomy promotion campaign in Brazil (Kincaid et al., 2002).

Associated time series studies, a similar approach, can be used to evaluate campaigns with less discrete time frames. In this variation, Hornik

⁴GRPs is a term used in advertising to measure the size of an audience reached by a specific media vehicle or schedule. GRPs are calculated by multiplying the percentage of the target audience reached by an advertisement by the number of times the target audience sees the advertisement during a given campaign.

explained, researchers document changes in behavior that coincide with “the accumulating presence of the intervention.” They try to determine whether other possible explanations for behavioral changes are viable by comparing regions that have and have not been exposed to the intervention. Such studies are useful for evaluating longer-term interventions for which good-quality data about outcomes exist when there are few plausible alternative explanations for observed effects, Hornik noted.

One example is a study of the National High Blood Pressure Education Program (Roccella, 2002). This program encompassed many different efforts (as opposed to a more discrete campaign that would be suitable for an interrupted time series) focused over an extended time (the 1970s and 1980s) designed to encourage people to have their blood pressure checked and ensure that physicians were giving the right medications. Another example is a study of the California Tobacco Control Program (Pierce et al., 2002). In this study, researchers looked at rates of smoking and sales and purchases of tobacco over a period that included a range of anti-smoking efforts, and compared California data with data for other states that did not receive the interventions.

Researchers also use small-scale quasi-experiments to compare a small number of treatment and control areas over time to see whether their change trajectories were the same, Hornik noted. There is a substantial risk that the treatment and control areas will not be sufficiently comparable to support strong claims, he cautioned, so such studies are most useful when there is little risk that differences unrelated to the intervention will affect outcomes. In one such study, of the Stanford Five City Project, researchers compared two treatment communities with two nontreatment communities (Farquhar et al., 1990). In another study, researchers compared communities that had a school anti-smoking program with communities that had that program plus a media campaign (Worden and Flynn, 2002).

In Hornik’s view, each of these methods offers a reasonable alternative to randomized controlled trials in some contexts (although he noted that quasi-experiments may be less useful than the other approaches). “When you move to these sorts of designs,” he concluded, “you have to tolerate a useful, if imperfect, answer, but at least the answer is to the right question.”

Hornik’s presentation prompted discussion of several issues. He was asked to summarize the primary methodological barriers to an effective evaluation of a large-scale communication and social marketing program. A primary barrier, he responded, is the challenge of obtaining accurate estimates of people’s exposure to an intervention, as well as of outcomes. Smoking, for example, is “a pretty discrete behavior,” he commented, but “a lot of different behaviors go into it (e.g., initiation, moving from trial use to addicted use, quitting attempts, quitting with various forms of personal and pharmacological assistance) and you may have to look at each of those

separately when constructing a persuasive campaign.” Thus, to measure outcomes, it is necessary to consider carefully which behavior one wants to change. In the case of obesity, it is much easier to change—and to measure changes in—food companies’ actions than people’s behaviors with regard to food. “We are kind of a long way from being able to link changes in exposure to changes in diet,” a presenter commented.

Rideout agreed, noting that “you have to be very precise about what you want to accomplish.” In her view, the suitable goal for a social marketing campaign is to raise awareness of risks and other information that can support behavioral changes. “It’s the first step,” she argued. Hornik responded that raising awareness should not be the only goal for a social marketing campaign. He suggested, that, although institutional and other communication interventions may need to occur together, “there’s a fair amount of evidence for behavioral effects of media campaigns.”

Is it then necessary to “invent a whole new system to measure both the exposure and the outcome”? another participant wondered. Hornik acknowledged that, for example, having a national cohort sample would make it easier to assess the effectiveness of strategies. He believes, however, that by combining the kinds of exposure data discussed by Rideout with data on changes such as those discussed by Ng, the approaches he described should make it possible to make some valuable claims.

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6

Assessing State and Community Efforts

Key Points Noted in Presentations

- Policies at the state, county, and community levels are designed to reduce obesity by addressing physical activity opportunities and nutrition issues. These policies are highly varied in quality, purpose, and implementation.
- The content of these policies is difficult to measure because of the variability of available data and because the policies themselves vary to such a great degree.
- Innovative approaches to mining available data and fostering collaboration across sectors and academic disciplines hold promise for providing more comprehensive information about obesity prevention-related policies.

Like federal policy makers, policy makers at the state, county, and municipal levels all have an interest in the health of their citizens and can play a significant role in efforts to reduce obesity. However, assessing the effectiveness of policy interventions related to healthy eating, active living, and obesity prevention can be difficult, Eduardo Sanchez, vice president and chief medical officer, Blue Cross and Blue Shield of Texas, noted in introducing a session on the role of states and communities. He observed that it is frustrating to see effected policy change not have the accompanying action necessary for the policy to make a difference, and that health

impact assessments are important tools for guiding the development and implementation of policies and programs. Panelists discussed existing measures for monitoring the reach and impact of the strategies used by state, local, and municipal policy makers and the sorts of data that can be used to track the progress of policy initiatives.

Maya Rockey Moore, president and CEO of Global Policy Solutions and program director of Leadership for Healthy Communities (LHC), discussed efforts of the LHC program to reach policy makers about ways to promote healthy eating and physical activity, with a particular emphasis on reducing childhood obesity. Laura Kettel Khan, senior scientist for policy and partnerships, Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention (CDC), spoke about community strategies and measures in obesity prevention. Amy A. Eyler, associate research professor, George Warren Brown School of Social Work and Prevention Research Center, Washington University in St. Louis, described efforts of the Physical Activity Policy Research Network (PAPRN) to foster research collaboration. Jamie Chriqui, senior research scientist, Health Policy Center, Institute for Health Research and Policy, and research associate professor in political science, University of Illinois at Chicago, described approaches to surveillance of public policies. Finally, Brian Cole, program manager and lead analyst, Health Impact Assessment Group, University of California, Los Angeles (UCLA) School of Public Health, addressed assessment of health impacts.

REACHING POLICY MAKERS

Presenter: Maya Rockey Moore

Obesity prevention involves “thinking about everything from the types of commercials we watch to the types of foods we have available in our communities to how communities are built, how buildings are constructed, and even how streets and sidewalks are laid out,” explained Rockey Moore. Most of these aspects of life are usually taken for granted, she added, so efforts to reduce obesity entail “systematically calling into question fundamental assumptions about our daily lives.” Doing so requires a broad policy perspective. It is policy makers who are responsible for the laws, regulations, and other factors that affect these aspects of society, she explained, and the LHC program works with national associations of policy makers to help educate their memberships about ways to promote healthy eating and physical activity; as noted, the emphasis of the program is on reducing

childhood obesity.¹ Rockeymoore described the organization and a recent evaluation of some of its results.

The program has two goals, Rockeymoore explained: to help build policy makers' commitment to pursuing policies that encourage healthy eating and active lifestyles, and to assist them in adopting, implementing, and strengthening such policies. LHC gives grants to organizations that serve those who govern tribes, states, local jurisdictions, and schools, in both the executive and legislative branches of government. The National Conference of State Legislators, the National Congress of American Indians, and the Association of State and Territorial Health Officials are just a few of the approximately 15 associations with which the program has worked. The grants support a range of activities all designed to promote, sponsor, and support public policies and programs that encourage healthy diets and physical activity. Examples of the ways the program works through these leadership associations to influence policy makers include educating members about promising policies and new research findings; elevating childhood obesity as a priority focus; and promoting, supporting, and sponsoring public policies that support obesity prevention.

LHC funds programs with a wide range of purposes and designs, Rockeymoore explained. Some programs work with policy makers in different roles at the state level, for example, to encourage them to collaborate on specific issues. Others provide technical assistance at the city or school level. One program that works at the national level (the National Association of Latino Elected and Appointed Officials) engages policy makers from every level of government. That group provides training in the nature of the childhood obesity problem and policy options for addressing it, as well as technical assistance to policy makers as they implement changes in their own communities.

LHC itself provides technical assistance and various forms of communication and outreach on reducing obesity. It also evaluates the results of the outcomes of programs it funds, impacts on policy makers, and the effectiveness of its own efforts. Evaluating the results of policy advocacy is difficult and is an evolving science, Rockeymoore observed. "Outcomes are often nebulous, attribution is difficult . . . and external influences are numerous and dynamic," she added. For example, the Let's Move Cities and Towns initiative launched by First Lady Michelle Obama² is likely to have had an impact in many of the same areas that LHC is targeting, and identifying the respective influence of each is difficult.

¹For details about the organization, see <http://www.leadershipforhealthycommunities.org/> (accessed August 2011).

²For more information about the initiative, see <http://www.letsmove.gov/> (accessed September 2011).

LHC, which was formed in 2002, completed an evaluation of the first cohort of organizations to which it awarded grants (Leadership for Healthy Communities, 2011). The evaluation was designed to collect information about the extent to which these 11 organizations increased their capacity to address childhood obesity, the nature and results of the outreach in which these 11 organizations engaged, the extent to which they effected increase in the political will of their members to act on obesity reduction goals, and the effectiveness of the processes they used. LHC used a range of evaluation tools. It asked both staff at the grantee institutions and policy makers targeted by the funded projects to complete surveys and conducted interviews with the policy makers. It required grantees to distribute evaluation forms at events and tallied those results. It also reviewed resolutions passed by grantee institutions and external data on state policy trends.

Rockeymoore presented the evaluation's findings. One is that through its grantees, LHC has reached a group of lawmakers who are primarily nonpartisan (although those with a declared affiliation are more likely to be Democrats), and 70 percent are white. Of the 11 grantees, 7 reported new commitments by their governing bodies related to reducing childhood obesity. Many increased staffing for obesity-related efforts and held workshops or conferences on the topic. All of the organizations also endorsed a strategy toolkit prepared by LHC, and many distributed LHC-sponsored publications. Several obtained additional funding from other sources to expand their efforts.

Rockeymoore reported a 19 percent increase in the number of "policy makers who agree or strongly agree that it is a policy maker's role to take action to help solve the childhood obesity crisis"—an increase from 79 percent in 2006 to 94 percent in 2009. She also noted that high proportions of the surveyed policy makers reported that the LHC-sponsored programs had raised their awareness and influenced them to take a range of actions. For example, the city of Charleston, South Carolina, created a master plan for children's health that incorporates obesity-reduction goals; the Colorado State Board of Education enacted new school beverage regulations that included a ban on the sale of sodas; and San Fernando, California, developed a new park—all changes initiated or supported by organizations that had received LHC grants.

COMMUNITY STRATEGIES AND MEASURES

Presenter: Laura Kettel Khan

Like the LHC program, CDC supports local governments and communities in obesity prevention. As Kettel Khan explained, CDC recommends both strategies and corresponding measures with which local governments

can plan and monitor their progress. These recommendations were developed in collaboration with an expert advisory group and the International City/County Management Association, a professional organization for urban planners and city managers, so that communities could use common measures that are relatively easy to put in place as they engage in long-term planning and funding decisions.

The approach to designing the recommendations grew out of recognition that there is scant knowledge of what works best for community efforts toward population-based obesity prevention, Kettel Khan explained. The process is grounded in existing evidence and expert opinion—as opposed to consensus—and is in some ways “aspirational, or even exploratory,” she added. The developers hoped that by ensuring an open process, in which all stakeholders would be involved in both decision making and documentation of each step, they would be able to begin the process of building a base of evidence about what works.

Kettel Khan and her colleagues used a two-part methodology for the analysis on which the recommendations were based. They developed a set of rating criteria to identify the highest-priority strategies:

- 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
- Sustainability—the health effects of the strategy will endure over time
- Effect size—the potential magnitude of the health effect for the strategy is meaningful

A similar process was used to nominate and select the most useful measures, based on the following criteria:

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

Having little basis for the initial selection of measures, the development team pilot tested possible measures to ensure that their collection was truly feasible. For example, one strategy selected was to improve access to supermarkets. One possible measure for this strategy was the number of supermarkets per capita, and another was the percentage of households within a 2-mile radius of each supermarket in a community. Applying the above criteria pointed the team to the second measure, which they pilot tested in 20 communities. They found that this was a feasible measure and selected it.

The results of this analysis were published in 2009. An article in *Morbidity and Mortality Weekly Report* details the methodology in detail (Khan et al., 2009), while another document describes the implementation of the strategies and measures and provides examples for communities to use as guidance (Keener et al., 2009). Kettel Khan stressed, however, that while the recommended strategies are grounded in evidence, they are suggestions, not validated standards.

This was a novel process for CDC, Kettel Khan explained, and she summarized what was learned from it. First, she noted, “simplicity was the key.” These strategies engage local government personnel who are not deeply involved in research or prepared to conduct primary data collection. Thus, the strategies need to be grounded in secondary data sources that are easy to obtain. Second, the partnership between local government officials and public health professionals that is needed for these strategies is not well established and requires attention. Kettle Khan explained that both sides had to think in new ways about the vocabulary they use and that public health workers needed to focus on messages that appealed to the interests of local government workers. In response to a question, she noted that at present, there is a paucity of data available to support guidance to communities about how long it is likely to take before results from any of these strategies are evident, and she agreed that that this represents an added challenge for those implementing strategies at the community level.

Many states have started to implement some or all of the recommended strategies, Kettel Khan noted, while a smaller number of states have made efforts to implement some of the measures. Minnesota, for example, which has an advanced state department of health surveillance system, has committed to incorporating all of the recommended obesity measures into its system, and Wisconsin has undertaken a validation study, using its electronic medical record system, of all 24 recommended measures. Funding from a CDC Preventive Health and Health Services Block Grant and a decision by the Department of Housing and Urban Development to incorporate the measures into several initiatives are likely to further expand the reach of the recommendations. In response to a question about whether CDC planned to systematically monitor or conduct surveillance of adoption of

the recommendations in communities statewide or nationwide, Kettel Khan indicated that there was no formal plan or designated funding to do so at the time of the workshop.

A number of other programs, both within CDC and sponsored by others, target obesity in various ways, Kettle Khan noted. Another CDC program, Communities Putting Prevention to Work (CPPW), which is focused on reducing morbidity and mortality associated with obesity and tobacco use, provides a “phenomenal, once-in-a-lifetime opportunity for investment in prevention,” Kettel Khan explained.³ It has several components, including \$450 million in funding to support 50 communities (urban, rural, and tribal) in efforts to:

- stabilize or decrease the prevalence of obesity,
- increase levels of physical activity,
- improve nutrition,
- decrease the prevalence of smoking and decrease teen smoking initiation, and
- decrease exposure to second-hand smoke.

Some of the funding will be in the form of direct grants to communities, and some will provide technical support for implementation and evaluation. Another component of CPPW is an investment of \$125 million at the state and territory level, and the program is reaching every state and territory and numerous communities around the country, Kettel Khan explained.

Kettel Khan also mentioned the Nutrition and Obesity Policy Research and Evaluation Network, a group of researchers who conduct transdisciplinary research on policy identification, development, and implementation.⁴ This is one example of a research network designed to link research efforts focused on an obesity-related theme, and PAPRN is another, discussed next.⁵

FOSTERING RESEARCH COLLABORATION

Presenter: Amy A. Eyler

PAPRN was developed in response to a finding that population-based improvements in physical activity “will most likely come from changes at

³For details about this program, see <http://www.cdc.gov/communitiesputtingpreventionto work/> (accessed September 2011).

⁴For details, see <http://www.nopren.org/> (accessed September 2011).

⁵More information on PAPRN can be found at <http://paprn.wustl.edu/Pages/Homepage.aspx> (accessed September 2011).

the macro, policy, or environmental level,” Eyler explained. PAPRN is a special-interest project funded through CDC’s Prevention Research Centers. It facilitates coordination among approximately 15 research centers around the country, some funded and some participating on a volunteer basis. With this many partners, Eyler explained, challenges were initially encountered in reaching consensus on PAPRN’s mission and the projects it would undertake. The mission ultimately developed was to identify physical activity policies and their determinants, describe the process of their implementation, and determine their outcomes. Figure 6-1, a framework that guides the network in developing its projects, illustrates the way policies operate at different levels and how they interact.

PAPRN also needed to establish what sorts of policies it would consider, and Eyler and her colleagues developed a working definition of a physical activity policy: “a legislative action, organized guidance, or rule that may affect the physical activity environment or lifestyle behavior. These policies can be in the form of formal written codes, written standards that guide choices, or common practices.” Because this definition encompasses many different approaches, studying their outcomes can be difficult, Eyler observed. As discussed in Chapter 2, physical activity policies may affect such aspects of a community as access to recreation areas or parks; bicycle rack policies at schools, libraries, or community centers; school recess options; the safety of play areas for children; workplace exercise options; and access to public transportation.

Data on such policies are collected in different formats, and the evidence base is better for some than for others, Eyler noted. For example, research has shown that physical education classes in schools will increase children’s exercise rates if they include significant amounts of moderate and vigorous physical activity for allotted times in a conducive environment. The evidence regarding the effects of building a community trail or sidewalk is still emerging, however. Comprehensive policy study requires multiple methodologies: surveys, case studies, and detailed qualitative studies set the stage for larger, more quantitative studies. In addition, evaluation must take into account the specific ways in which policies are implemented, which will also affect outcomes, Eyler added.

Eyler described several PAPRN studies and some of the lessons she and her colleagues have learned. Two PAPRN studies have examined state legislation. For a study of physical education (PE) plans (Eyler et al., 2010a), researchers used a legislative database called Netscan to identify almost 800 bills related to physical activity. For the years 2001 through 2007, they found that approximately 20 percent of the bills were enacted (a rate similar to that for other health-related bills) but that very few of those bills contained the components of PE that research has identified as important: time allotted, activity level, teacher certification, and the environment in

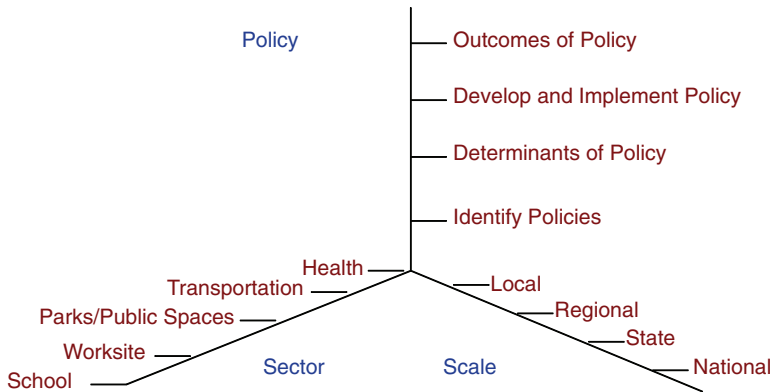


FIGURE 6-1 Physical Activity Policy Research Network framework.

SOURCE: Reprinted, with permission, from T. L. Schmid, M. Pratt, and L. Witmer, 2006, “A framework for physical activity policy research,” *Journal of Physical Activity and Health* 3(Suppl 1):S20-S29.

which the PE is offered. Moreover, little funding has been allocated for evaluation of these bills’ effects. Although PAPER found that more work is needed on the content of legislation, as well as implementation and evaluation, Eyler noted that these results provide a good basis for future policy surveillance. The content analysis tool developed for this study has also been valuable in other PAPER studies.

Another study of state legislation focused on provisions for public walking trails between 2000 and 2008 (Eyler et al., 2010b). Of the 991 bills the researchers found on this subject, a little more than half concerned the allocation of federal funds, so they analyzed those bills separately from purely local measures. Of the 475 bills not related to federal funds, 29 percent were enacted. Emerging evidence indicates that such factors as connectivity, accessibility, maintenance, funding, and liability influence the extent to which a new trail will boost physical activity, but the data are not as firm as those for the critical components of PE.

From these two studies, Eyler and her colleagues found, first, that states collect a significant amount of information on legislation and that it is relatively easy to scan some physical activity-related topics—such as PE—using databases such as Westlaw or Lexis-Nexis. Other topics require more tedious effort, she added, and states vary in the quality of both what they report and the legislation they put forward, as well as in the language they use to refer to physical activity-related elements. This variation can make it difficult to interpret and compare bills without the assistance of

policy experts or lawyers. Looking at bills that were not enacted can also be instructive, Eyler added, and it is critical to look as well at the implementation of those that were.

PAPRN researchers also analyzed state obesity plans and programs, comparing the planning that was done, the frameworks, and the goals and objectives related to physical activity. Forty-three states have some sort of plan, although they vary in form and focus. Few have an in-depth orientation toward physical activity, Eyler noted, and none address all the components of the National Physical Activity Plan.⁶ State plans are more likely to focus on traditional approaches, such as PE, she added, than on such emerging issues as land use and community design, transportation, and parks and recreation. Like the legislation research, Eyler explained, this study provides a good basis for further study. PAPRN is developing a template states can use to develop more comprehensive plans that is based on this research, as well as a similar tool based on a study (Steinman et al., 2010) of regional master plans for bicycle use and pedestrian traffic.

Another PAPRN study (Eyler and Swaller, in press) examined policies on community use of public school facilities (also known as “joint use”) in Missouri school districts. The researchers found that 71 percent of the districts had a plan for community use in place, but that the majority had copied the policies of either the School Board Association or Missouri Consultants for Education. They concluded that influencing policies at the school board level or the consultant level is likely to have a wide influence on district policy.

Eyler highlighted several conclusions from the work PAPRN has done. First, she noted that experience with other issues that have been the focus of public health efforts for some time, such as tobacco and food policy, is likely to be useful in work on physical activity. Consistent methodology—for example, for tracking, evaluation, and measures—makes it easier to compare and assess existing efforts. Also important is to pay attention to the level at which policies are initiated and the settings in which they are to be implemented. The ways in which policies at different levels may interact are important influences on outcomes, Eyler added. Above all, policy makers and funders want to know whether policies work and if so, how.

SURVEILLANCE OF PUBLIC POLICIES

Presenter: Jamie Chriqui

Understanding the precise nature of existing laws and policies is critical to assessing implementation and impact, observed Chriqui. She described

⁶See <http://www.physicalactivityplan.org/> (accessed September 2011) for more information.

several approaches to conducting surveillance of public policies, and offered a definition of public health policy surveillance similar to that of the more familiar surveillance of public health issues: “the ongoing, systematic collection, analysis, interpretation, and dissemination of information about a given body of public health law and policy” (Chriqui et al., 2011).

Chriqui distinguished policy surveillance from policy tracking, noting that surveillance is a way of examining change over time. Quantitative measures that can be linked with epidemiologic and other outcome data are used in surveillance, whereas policy tracking systems tend to use text to describe the elements of bills or simply record the existence of bills that address a particular issue. Surveillance data are tied to specific points in time so that the elapsed time between enactment and impact can be assessed, whereas tracking systems tend to report on new bills introduced within a time window. Policy surveillance, Chriqui added, is designed primarily for evaluation, whereas policy tracking is designed for reporting and advocacy.

Box 6-1 lists examples of both tracking and surveillance systems. Chriqui highlighted in particular the CLASS (Classification of Laws Associated with School Students) and Bridging the Gap programs as providing a wealth of information on state laws associated with school-based nutrition and physical education issues and with state nutrition and obesity laws, respectively. State governments and boards of education use these data as they plan changes to their laws and policies. Data from these projects have supported such initiatives as the federal Healthy, Hunger-Free Kids Act, the U.S. Department of Agriculture’s efforts to develop nationwide standards for competitive foods in schools, and the White House report on childhood obesity (White House Task Force on Childhood Obesity, 2010).

Policy measurement is “an emerging area of need,” Chriqui observed, but like any other science, it requires systematic, reliable, and valid measures. “It’s easy to do it wrong,” she noted, “and very hard to do it right.” Existing measures vary. For example, current measures of the policies affecting the built environment were not formulated for scientific purposes, but groups such as the American Planning Association have developed auditing tools to fill the gap. As an example of what can be done, said Chriqui, researchers have developed a detailed tool for coding wellness policies that provides approximately 50 pages of coding guidance. It includes individual variables for each category of nutrition education, physical activity and physical education, school meals, competitive foods sold in schools, implementation, evaluation, communications, and marketing environments in schools (Schwartz et al., 2009).

Several resources exist for state-level data, Chriqui noted, such as Westlaw, Lexis-Nexis, and State Net, but there are no comparable, comprehensive resources for community-level policies. In many cases researchers must collect information directly from municipalities and counties or school

BOX 6-1**Examples of Public Policy Tracking and Surveillance Systems****Obesity-Related Tracking Systems**

- Centers for Disease Control and Prevention's (CDC's) Division of Nutrition and Physical Activity Legislative Database (<http://apps.nccd.cdc.gov/DNPALeg/index.asp>)
- National Association of State Boards of Education (NASBE) School Healthy Policies Database (http://nasbe.org/healthy_schools/hs/index.php)
- National Conference of State Legislatures Bill Summaries Database (<http://www.ncsl.org>)
- Yale Rudd Center for Food Policy & Obesity Legislative Updates (<http://www.yaleruddcenter.org/legislation/>)

Obesity-Related Surveillance Systems

- National Cancer Institute's Classification of Laws Associated with School Students (CLASS) System (school-based nutrition and physical education policies currently) (<http://class.cancer.gov/About.aspx>)
- Bridging the Gap/ImpacTeen State Obesity-related Policy Data (http://www.bridgingthegapresearch.org/research/sodasnack_taxes)
- Bridging the Gap Wellness Policy Coding System (http://www.bridgingthegapresearch.org/research/district_wellness_policies)

Surveillance Systems Not Related to Obesity

- CDC's State Tobacco Activities Tracking and Evaluation System (<http://apps.nccd.cdc.gov/statesystem/Default/Default.aspx>)
- National Institute on Alcohol Abuse and Alcoholism (NIAAA) Alcohol Policy Information System (APIS) (<http://alcoholpolicy.niaaa.nih.gov/>)

SOURCE: Chriqui, 2011.

districts if they are interested in district-level policies. Chriqui suggested that data collected directly tend to be more accurate than survey data when the goal is to understand what policies are “on the books” compared with what policies are being implemented in practice (surveys of local officials being well suited to the latter).

Collecting such data is time and resource intensive, Chriqui pointed out, explaining that this is an emerging field in which relatively few researchers are engaged. Most currently available obesity-related policy measures focus on school settings, she added; fewer address broader aspects of the community, the built environment, and the food environment. Therefore, much work remains to be done. Nationwide measures of such policies would be valuable, Chriqui added, so that researchers and policy makers could look

more systematically at the policies that are being implemented in order to understand why or why not they are having the intended effect. As others had mentioned earlier in the workshop, few existing measures correspond specifically to research-based recommendations for reducing obesity. Thus in Chriqui's view, "we need the capacity to develop systems to do longitudinal, ongoing policy surveillance on issues related to the physical and food environments."

Several participants probed the challenges of understanding what states and communities are doing, given their significant variability, and wondered how that variability might be reduced. "The next stage of policy change may be to work closely with policy makers to help them understand the elements that make policies stronger, such as accountability structures and funding mechanisms," one observed. In response to a question, Chriqui explained that while 43 states have obesity plans, most adopted them because doing so is a requirement for receiving CDC funding, and few states have focused on implementation and evaluation. Comparing policies is difficult, Eyler added, because there is no common unit. Looking just at, say, bicycle-pedestrian master plans, "a city as big as Chicago or a group of three communities in Missouri [might have plans, so] we're comparing apples to oranges," she noted.

ASSESSING IMPACTS ON HEALTH

Presenter: Brian Cole

Cole discussed two tools for influencing decision making related to obesity reduction efforts: health impact assessment (HIA) and health forecasting. HIA is a way of systematically evaluating, synthesizing, and communicating information, but it typically focuses outside the sectors with which public health and health care experts are usually concerned, he added. It is based on the idea that many opportunities for significant improvements in public health may lie outside the typical public health purview, such as, in the case of obesity reduction, farm subsidies or transportation policy. Some of the connections to obesity are straightforward, Cole noted, but others are less so. For example, an HIA of oil and gas production on the north slope of Alaska identified significant impacts on subsistence hunting and probable increases in rates of diabetes among neighboring populations. A similar analysis of proposed drilling in an oil field located in a high-density park area in Los Angeles showed that it would significantly reduce opportunities for physical activity in that area.

HIA is designed to identify the potential health effect of a proposed policy or project, Cole explained, including intended and unintended benefits and harms. In this way it differs from environmental impact assessments,

which focus only on the prevention of harm. HIA uses a mix of qualitative and quantitative methods within a standardized framework, with the goal of producing information that stakeholders and policy makers can readily use in decision making. For that reason, Cole added, it is important for experts from different sectors and community stakeholders to help guide the assessment.

Health forecasting, which can be a tool in an HIA or be used on its own, is way of applying different scenarios—such as environmental exposures, demographic shifts, or policy changes—to a synthetic population to explore possible outcomes. In conducting such analyses, researchers apply existing research evidence—such as data on associations between particular exposures and effects or trends in the prevalence and distribution of health conditions and risk factors—as well as established rules regarding the interactions among risk factors, to develop alternative models of what might happen over time. “The time component is really important,” Cole added, because HIAs generally do not look at incremental changes that manifest themselves gradually. Health forecasting models have been used to address such issues as the health and economic costs of overweight in California (Fielding et al., 2007), associations between physical activity and coronary heart disease (van Meijgaard et al., 2009), and the lifetime medical cost burden of overweight and obesity (Finkelstein et al., 2008) (for other examples, see Edwards and Clarke, 2009, and Roux et al., 2008).

Both HIA and health forecasting, Cole explained, bring a structured analytic approach to bridging the gap between research and policy. For example, based on the findings from an HIA of the Atlanta Beltline Project (a program to improve a land corridor surrounding Atlanta), the Environmental Protection Agency awarded a \$1 million grant to help clean up abandoned industrial sites in the study area. Another HIA in Atlanta, of the Buford Highway corridor, spurred DeKalb County to invest in improving pedestrian infrastructure to enhance safety and boost physical activity. An HIA of California’s Proposition 49 revealed that it could potentially exacerbate existing disparities in access to after-school programs. After release of the HIA and briefings with state lawmakers, rules implementing the law were modified to help ensure that after-school funds would go to schools and students most in need.

Since 2000, the year the first HIA was completed in the United States, approximately 130 such analyses have been conducted, Cole noted. His review of the 75 for which comprehensive information was available revealed that many (32) examined local projects such as urban redevelopment transit efforts; 22 concerned land use; and 16 focused on social policies such as labor laws, living wage policies, paid leave, and school policies. Only a few such analyses to date have examined resource policies, but Cole regards those as important because they offer the potential to establish links

with environmental impact assessments. These studies have explored factors, or potential disease pathways, such as

- exposure to air pollutants;
- housing adequacy and affordability;
- traffic injuries;
- parks and green space;
- income adequacy and social equity;
- noise;
- mental health;
- social capital and community cohesion;
- access to jobs, stores, schools, and recreation;
- walkability and physical activity; and
- diet, nutrition, food safety, and food insecurity.

Many sorts of data are used in HIAs, Cole explained. Figure 6-2 illustrates the data needed for an HIA of a redevelopment project designed to improve walkability. Baseline data on the original conditions and prevalence of walking in the targeted areas are needed. Analysts also need details on the effects the project was expected to have. Thus, the researchers examine audits, survey data, the research literature, and other materials. Cole noted, however, that in many cases, improved data are needed to support an HIA of physical activity. Specifically, he cited the importance of:

- assessing total minutes of physical activity (on a daily or weekly basis), as opposed to bouts or days;
- using higher sampling rates to provide robust estimates of physical activity for small areas and populations (i.e., at the level of counties or smaller);
- including all types of physical activity, not just activities labeled “exercise”;
- using longitudinal data to track physical activity over the life span;
- evaluating community interventions that track cohorts before and after interventions;
- paying greater attention to cross-validation of self-reported physical activity and accelerometry⁷ data in diverse populations; and
- using off-the-shelf tools⁸ to estimate physical activity in small areas—for example, to infer physical activity for small areas or

⁷An objective measure of physical activity.

⁸For example, akin to those developed for the EpiQMS (Epidemiologic Query and Mapping System) developed by the Pennsylvania Department of Health; see <http://app2.health.state.pa.us/epiqms/Asp/ChooseDataset.asp> (accessed October 14, 2011).

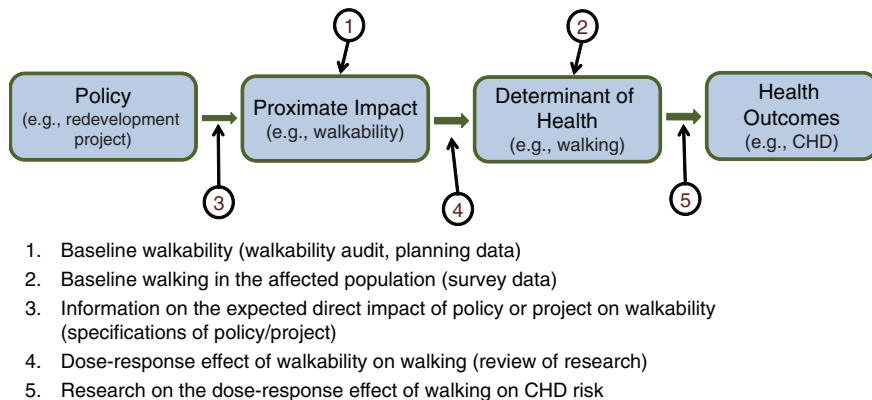


FIGURE 6-2 Data needed for a health impact assessment of a redevelopment project designed to improve walkability.

SOURCE: Cole, 2011.

populations from larger samples for which demographic and environmental determinants are known.

Cole closed with a few thoughts on how HIA and health forecasting could be used even more effectively. Sharing of data resources—particularly those not typically used in peer-reviewed studies, such as analyses conducted by county health departments—is important. Cross-sector and interdisciplinary meetings and other connections can facilitate data sharing and build awareness of what is available from other sectors. Important as well is to include more environmental factors associated with physical activity in data collection, and greater communication and collaboration can help with that. A national, web-based clearinghouse called HIA-CLIC (Health Impact Assessment Clearinghouse Learning and Information Center)⁹ provides information, tutorials, and other resources related to HIAs, Cole noted, including an archive of HIAs that have been conducted in the United States.

Workshop participants discussed ways to increase the use and reach of HIAs. One noted that during the Clinton administration, “there was a mandate for environmental justice to be considered in environmental impact statements,” and wondered whether a similar mandate could work in the case of obesity. Environmental impact statements are required only when there is an expected change in the environment as a direct result of

⁹See <http://www.hiaguide.org/> (accessed September 2011).

a proposed project, another participant noted. Another promising avenue might be funding mechanisms, a participant suggested. If an HIA requirement were integrated into the funding arrangements for new developments, it might help to “integrate [HIA] into the way we conceptualize building our communities—and be a mechanism for considering the health impact of everything from walkability to the quality of the air we breathe.” This participant suggested that environmental impact statements have had the greatest benefit by affecting planning from the outset—once people are aware that minimizing environmental impacts is easiest if it is a design consideration from the beginning.

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7

Disparities and Measurement

Key Points Noted in Presentations

- Tackling the disparities in obesity rates among population sub-groups is an important component of the overall goal of preventing and reducing obesity.
- A community approach to improving nutrition among minority and low-income populations with particularly high rates of obesity—an approach in which the food environment and community attitudes are addressed from multiple vantage points—shows promise.
- Measurement and evaluation must be highly adaptive to the local and sometimes changing conditions throughout an intervention. Modifications may be needed in order for measures to remain relevant to the evaluation.
- Accurately measuring physical activity is challenging, and as a result, disparities in this area are not fully understood. Objective measures are accurate but quantify only amount of activity; subjective measures do not reflect total energy expended and can easily be misinterpreted.
- It is important to look across both populations groups and types of data to understand physical activity patterns and ways to increase activity levels.
- Food marketers have extremely sophisticated means of understanding the interests and needs of various populations and are particularly adept at targeting ethnic and racial minority groups.

There are significant disparities among racial and ethnic groups in rates of obesity. Obesity has been rising more steeply among African American and Hispanic children than among children in other ethnic groups, explained Shiriki Kumanyika, professor of epidemiology in the Departments of Biostatistics and Epidemiology as well as Pediatrics (Section on Nutrition) and associate dean for health promotion and disease prevention at the University of Pennsylvania Perelman School of Medicine, in introducing a discussion of disparities and their implications for measurement. African American girls and Hispanic boys are particularly likely to have weight levels in the obese or very obese range, she added. Adult African American and Hispanic women both had high levels of obesity before the current epidemic began, and these levels have continued to increase with the epidemic in the general population. Obesity rates also are generally higher among populations of low socioeconomic status.

Health disparities are defined by the Centers for Disease Control and Prevention (CDC) as “differences in health outcomes that reflect social inequalities,” and CDC finds that such disparities are “both unacceptable and correctable” (CDC, 2011, p. 1). Thus, Kumanyika pointed out, “part of addressing the [obesity] epidemic has to include closing that gap.” To address the gap, she added, it is important to recognize that environmental, social, and cultural contexts for addressing obesity vary just as does its prevalence, and that solutions that will be effective within these different contexts also vary. Moreover, she noted, narrowing the gap will require attention to two goals: “one is to make everybody better off and the other is to help those who are worse off catch up.”

These issues present measurement challenges, Kumanyika observed. It is important to ask whether existing measures are sensitive enough “to pick up nuances or even big-picture issues that differ for population subgroups defined by ethnicity or socio-economic status,” she explained. Also important is to consider whether the measures focus on the right questions for each group, given potential differences in sociocultural contexts for food and physical activity.

Kumanyika also emphasized that disparities in obesity rates are not new. A 1985 report on the health of minority groups from the Department of Health and Human Services (HHS, 1985) identified obesity as one of the modifiable risk factors that could, if addressed, lead to a closing of the gap between white and minority populations in rates of cardiovascular disease and diabetes.

Some data Kumanyika presented illustrate how obesity prevalence and trajectories differ for ethnic minority compared with non-Hispanic white populations. Figure 7-1 shows changes in the population percentage at or above a body mass index (BMI) of 30 for African American, Mexican American, and white males and females between 1960 and 2004. Figures

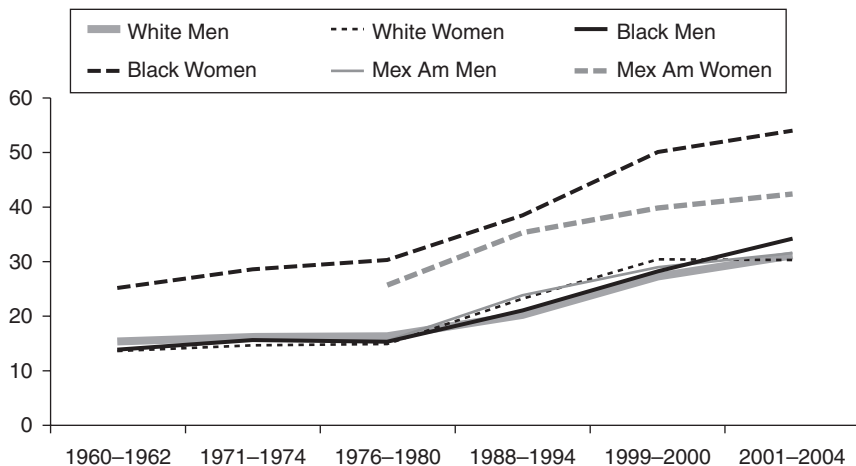


FIGURE 7-1 Obesity prevalence trends in three ethnic groups.

NOTES: Mex Am = Mexican American. Obesity is defined for adults as a body mass index at or above 30 kg/m². Data reported for whites and blacks in 1960-1962 (National Health Examination Survey) and 1971-1974 (National Health and Nutrition Examination Survey) include persons of Hispanic and non-Hispanic origin. Persons of Hispanic origin were excluded from the data for whites and blacks from 1976 onward. Data for Mexican Americans shown for 1976-1980 are from the Hispanic Health and Nutrition Examination Survey (1980-1982). Data are for adults aged 20-74, age-adjusted to the 2000 standard population.

SOURCE: NCHS, 2002 (for 1960 through 2000) and NCHS, 2006 (for 2001-2004).

7-2 and 7-3 focus on trends among girls (showing data for adolescents) and boys (showing data for school-age children), respectively, between 1976 and 2006. Figure 7-4 shows rates of obesity in children by both their poverty status and their racial/ethnic group, and highlights the differences in the patterns across three groups.

What is most important, in Kumanyika's view, is that, regardless of the prevalence rates, "the conditions for addressing obesity are not as good in ethnic minority and low-income communities." She closed by presenting a model that guides research in the African-American Collaborative Obesity Research Network (Figure 7-5). The traditional focus of research on the energy balance issues that cause obesity, she noted, is one of the elements in the middle of the diagram, but a more community-oriented approach takes into consideration the role of the history and social context of each population, as well as the physical and economic environment and the cultural and psychosocial processes that influence personal perceptions and behaviors.

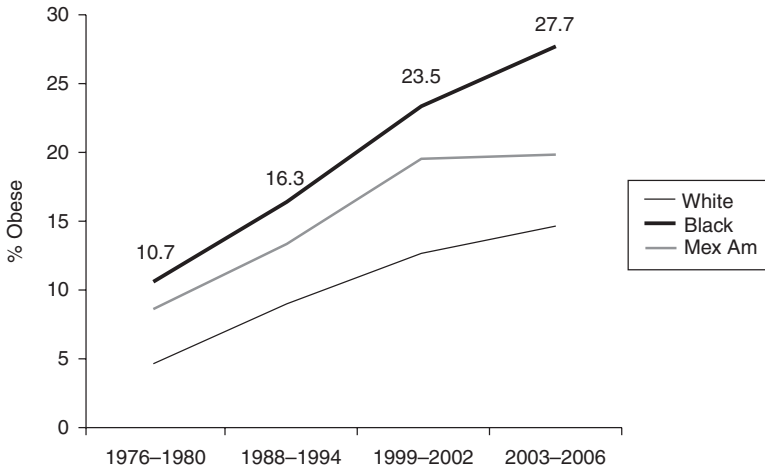


FIGURE 7-2 Obesity trends in 12- to 19-year-old girls in three ethnic groups.
 NOTE: Obesity is defined for children and adolescents as a body mass index (BMI) at or above the 95th percentile on the age- and sex-specific 2000 Centers for Disease Control and Prevention (CDC) BMI growth charts.
 SOURCE: NCHS, 2009.

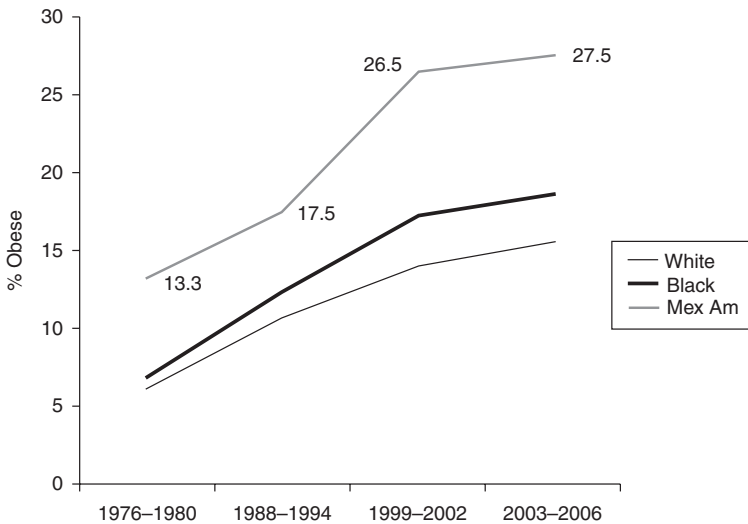


FIGURE 7-3 Obesity trends in 6- to 11-year-old boys in three ethnic groups.
 NOTE: Obesity is defined for children and adolescents as a body mass index (BMI) at or above the 95th percentile on the age- and sex-specific 2000 Centers for Disease Control and Prevention (CDC) BMI growth charts.
 SOURCE: NCHS, 2009.

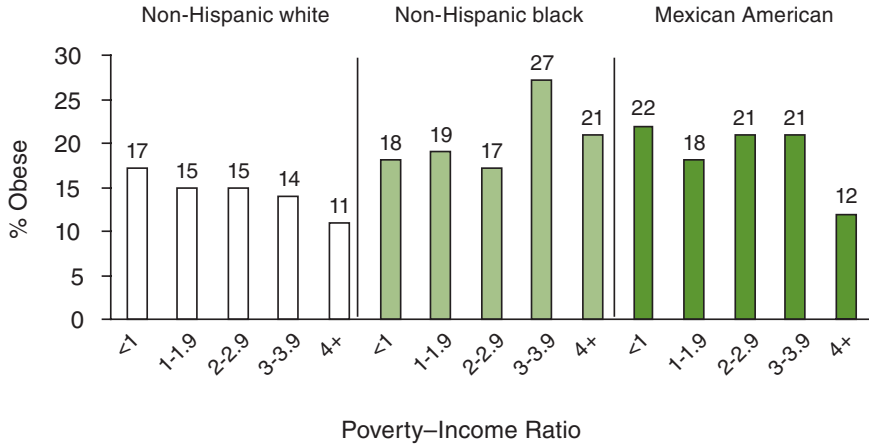


FIGURE 7-4 Percentage of children and adolescents aged 2-19.9 who are obese, by family poverty-income ratio.

NOTES: Obesity is defined for children and adolescents as a body mass index (BMI) at or above the 95th percentile on the sex- and age-specific 2000 Centers for Disease Control and Prevention (CDC) BMI growth charts. The poverty-income ratio is the ratio of the income of the family to family income at the poverty level. Families with an income ratio of less than 1 are below the poverty threshold.

SOURCE: Freedman et al., 2007.

In other words, she explained “focus on the people and help them with the problem as opposed to focusing on the problem and trying to squeeze everybody into a very narrow box”—referring to the relatively limited perspective derived from the strictly biomedical view of energy balance.

With those thoughts as background, presenters addressed disparities in three specific areas. Sarah Samuels, president of Samuels & Associates, spoke about disparities related to diet. Carlos J. Crespo, professor and director of the School of Community Health, Portland State University, focused on disparities related to physical activity. Finally, Sonya Grier, associate professor of marketing, Kogod School of Business, American University, looked at the role of marketing in these disparities.

DISPARITIES RELATED TO DIET

Presenter: Sarah Samuels

The availability of healthy and unhealthy foods is a key factor in disparities in weight and health, explained Samuels. Despite efforts to curtail the availability of unhealthy foods, one need not travel far in the United

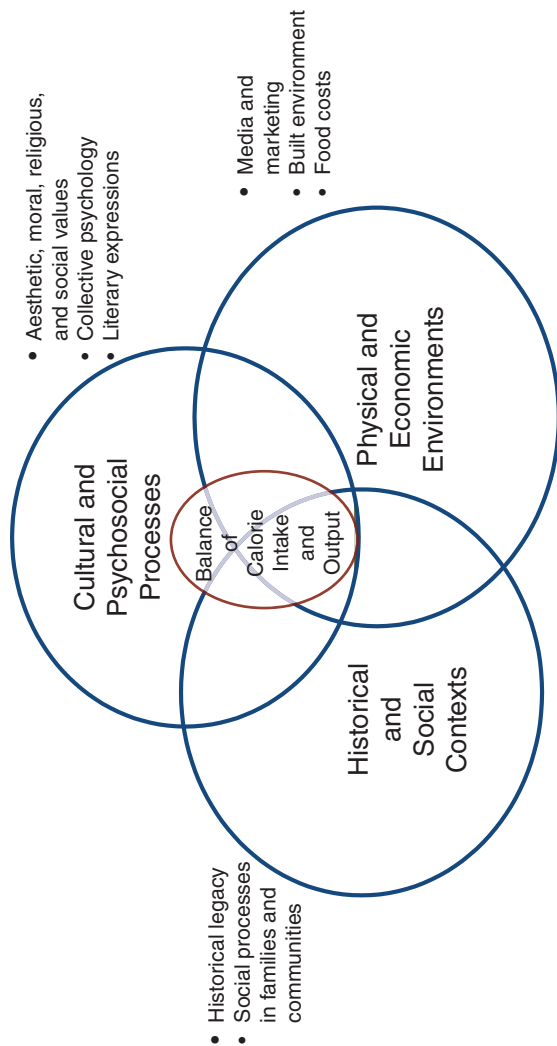


FIGURE 7-5 Community perspective on obesity influences. SOURCE: Adapted from Kumanyika et al., 2007.

States to find an area that is densely populated with fast-food outlets. Some U.S. schools have benefited from efforts to improve the nutritional profile of the foods and beverages available to children during the school day, but many communities are lacking nutrition policies or standards to guide what is available. In such schools, there is “a sea of marketing and promotion of unhealthy foods,” Samuels observed.

Samuels believes that an environmental approach to improving diets is particularly important for low-income communities, where resources are limited and obesity risk is concentrated. Individuals make many decisions about diet within the contexts of school, neighborhood, and the workplace, and unhealthy foods are dominant among the available choices in many communities. Community-wide programs, Samuels explained, can create a seamless environment for children, promoting healthier choices wherever they go, and can have a much broader reach than programs focused on changing behavior at the individual level.

Evaluation and Measurement

Samuels and her colleagues have developed a theory of change to guide evaluations of programs designed to improve access to healthy foods. This theory defines the steps required for improvement (Samuels & Associates, 2008):

- Step 1—Change the environment to create greater access to healthy foods.
- Step 2—Change norms so that healthier choices become the easier choices.
- Step 3—Residents make healthier choices.
- Step 4—Health indicators, such as BMI, improve.

To measure the progress these steps describe, she added, means measuring improvements in food environments, tracking the adoption and implementation of policies and their strength, measuring the changing attitudes and practices of both policy makers and community residents, and measuring health outcomes.

Samuels and her colleagues have developed several tools for these measurements, which they have used in communities across the country. One is FoodBEAMS, a database of information about the competitive food environment that contains data on more than 5,000 food, beverage, and snack items sold in vending machines and other places in schools outside the school meals programs.¹ It allows users to analyze the foods and beverages

¹See <http://www.foodbeams.com/> (accessed September 2011) for more information.

available in a particular school to determine whether they comply with state nutrition standards (the database currently is based on California's standards, but links to other standards are under development). Another tool developed by Samuels and colleagues is the Store Assessment Tool, used for documenting the presence, placement, quality, promotion, and price of healthy and unhealthy foods in store settings. As Table 7-1 and Figure 7-6 illustrate, this tool allows researchers to see food choices through the eyes of consumers and to document the ratio of healthy to unhealthy choices. The example in Figure 7-6 quantifies the experience of shopping in a store where small amounts of fresh fruit, yogurt, and other healthy foods are overshadowed by a large volume of candy, chips, and cookies.

Assessment of Two Example Programs

One community initiative Samuels and her colleagues have evaluated—Healthy Eating, Active Communities (HEAC)—focused on reducing disparities in obesity and diabetes by improving the food and physical activity environments for school-age children in six low-income California communities (Samuels & Associates, 2010b).² The program targeted policies and organizational practices in five sectors: school, after-school time, neighborhood, health care/public health, and marketing and advertising. Each of the communities received supplemental funding over 5 years for their schools, community organizations, and local public health departments. A second initiative evaluated—the Central California Regional Obesity Prevention Program (CCROPP)—worked in a similar way in eight counties in the Central Valley of California, an area in which there are significant health disparities related to access to both healthy foods and physical activity opportunities, exacerbated by issues of racism and immigration (Samuels & Associates, 2010b; Schwarte et al., 2010).

Samuels and her colleagues used a variety of measures to assess changes resulting from these two programs. The primary goal with regard to the food environment (they also evaluated physical activity effects) was to assess the extent to which access to healthful foods in schools, after school, and in neighborhoods had improved. Among the tools they used were

- assessment of the competitive food environment (foods and beverages sold on school campuses outside of school meals programs),
- survey of students' nutrition and physical activity,
- environmental assessment of neighborhood foods and beverage marketing,

²See <http://www.partnershipph.org/projects/heac/> (accessed September 2011) for more information.

- in-store assessment of available foods and beverages,
- environmental assessment of farmers' markets,
- policy tracking,
- surveys of community residents,
- focus groups with students and parents, and
- surveys of policy makers.

The researchers provided ongoing feedback to the community, Samuels noted, so the community could use the data and information to help advocate for its own local programs.

Samuels highlighted several key findings. The adoption of nutrition standards did yield an overall improvement in the nutritional value of foods available in school and after-school environments, and school district food services did not lose money when healthier foods were sold on school campuses. Students did continue to purchase competitive foods, but were more likely to participate in school meals programs. Students reported making healthier choices and said they supported the changes in the foods available to them.

Looking at effects in the wider community, Samuels noted that innovation resulting from the programs created new venues for the sale of fresh and locally grown produce. Community residents reported making use of farmers' markets and produce stands, and the proportion of advertisements for healthy foods inside stores increased three-fold (although the percentage of such advertisements outside of stores decreased). In Samuels' view, the greatest achievement was the mobilization of residents, especially young people, around nutrition and physical activity. In both studies, youth and other residents reported support for the new strategies, and a shift occurred from thinking about obesity as an individual problem to thinking about it as a community problem, Samuels observed.

The two programs also influenced policy makers' attitudes and practices. Both liberal and conservative policy makers supported policy solutions designed to improve community environments, although they expressed some concern about finding the resources needed to implement changes. New relationships forged among grantees involved in the programs and community partners have the potential to influence local and school policies. Health departments and health care workers also reported greater engagement with community efforts and support for policy strategies.

Samuels emphasized that the evaluations were able to use quantitative and qualitative measures to capture a diverse array of outcomes, which could be reported to diverse audiences. By providing standardized baseline, midpoint, and endpoint measures, she and her colleagues developed a picture of change that was easy to communicate. The results provided strong evidence for the extent to which policies lead to environmental change. The

TABLE 7-1 Excerpt from the Store Assessment Tool

Food Categories	Check (✓) All Locations Where Foods Are Found							Total Varieties	Notes
	Outside of Store	Inside the Store					Center		
		Front Wall	Cash Register	Side Walls (2)	Back Wall				
Bread - Whole wheat/whole grain									
Bread - Refined flour/white bread									
Cereal - <7g sugar per serving and whole grain									
Cereal - ≥7g sugar per serving and not whole grain									
Cheese - Regular									
Cheese - Light/Reduced Fat									
Fruit- Dried (no sugar added)									
Fruit - Fresh whole fruit									
Fruit - Fresh ready-to-eat cut up fruit									

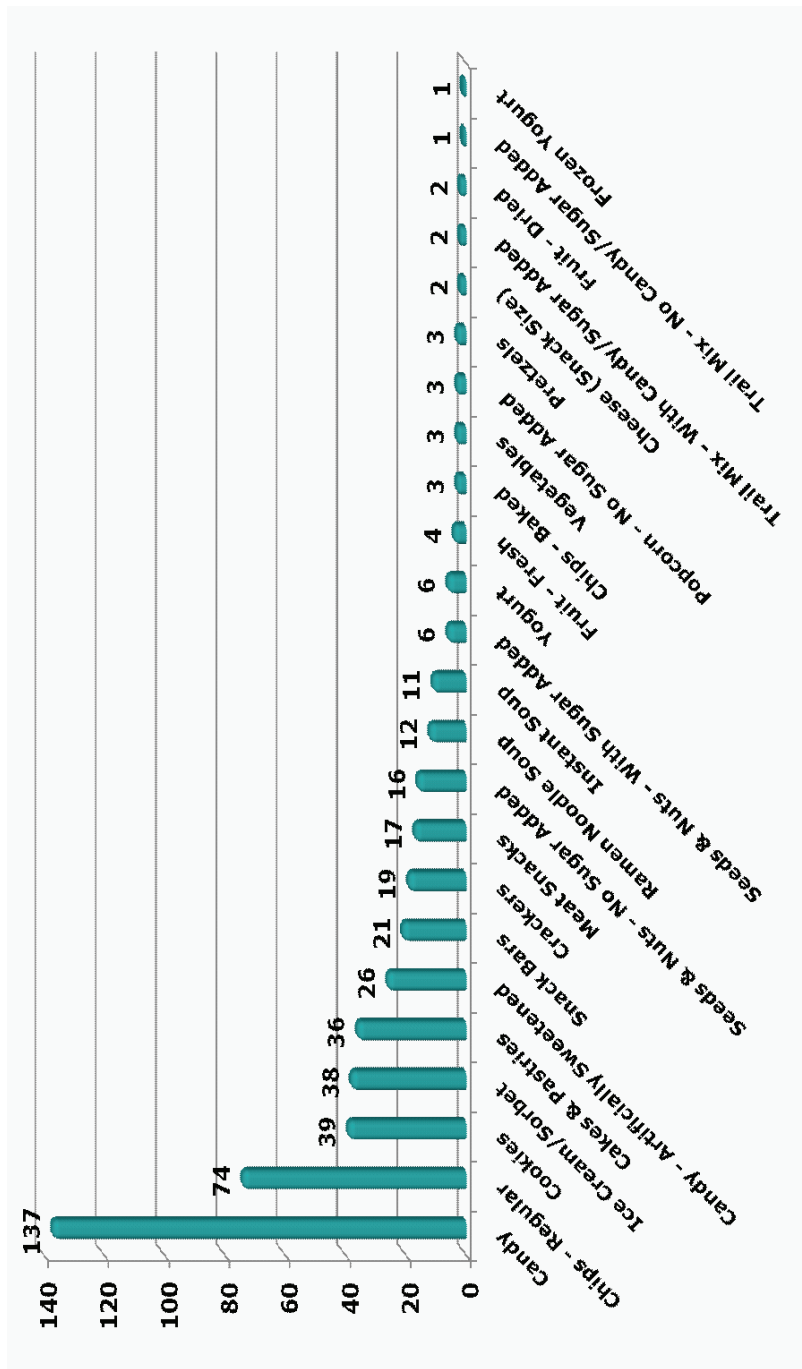


FIGURE 7-6 Food choices available in a store analyzed using the Store Assessment Tool.
 SOURCE: Samuels & Associates, 2010a. Reproduced with permission of Samuels & Associates, Oakland, CA.

evaluations had to be flexible, Samuels noted: “We had to make modifications as we went along based on what people were doing. The outcome measures really needed to be tied to the interventions and what it was really realistic to expect.” Moreover, she added, many environmental strategies take a long time to be fully implemented and to show effects. It can be difficult to capture the full scope of change within a confined evaluation period.

Samuels closed with a few recommendations for the field. Standardized approaches to monitoring policy adoption and implementation that could be used across the country would make it much easier for researchers to collect and compare information. “We really need to be able to measure the strength of a policy,” she emphasized, and “the more the measures can be standardized, and policies can be standardized, the easier it’s going to be.” Specifically, she added, “we need to measure the changes in the environment, know the impact of the intervention on the environment, and learn whether the change in the environment is strong enough to have an impact on behavior.” Measures that could be used to track the perceptions, attitudes, and opinions of policy makers, youth, and community residents would also be valuable in assessing the impact of environmental change, she added.

In conclusion, Samuels said that in conducting evaluations, it is important to look across communities, sectors, and strategies. “Ultimately what we want to learn is whether there’s synergy with all of these efforts combined that is enough to tip a community—especially a low-income community where resources are limited—into being a place that promotes health and provides access to healthy choices,” she observed. Because resources in low-income communities are limited, she added, it is important to determine which policies and practices must be in place in order to impact health outcomes.

DISPARITIES RELATED TO PHYSICAL ACTIVITY

Presenter: Carlos J. Crespo

Obesity “shows up at the doctor’s office,” Crespo noted, “but the solution is a community solution.” There is little a doctor can do for an individual, but the community can do much more, he added, echoing a major theme of the workshop. Changing behaviors and environments at the community level is as complex as is applying the standard scientific approach of using randomized controlled trials to identify the most effective interventions. “We know we have an obesity problem,” he commented. “We have disparities, and we know the risk factors.” The difficulty, he added, is that

“we are not rats; we are living in a free market society where we buy what we want and do what we want to do.”

Researchers have examined numerous categories of people to discern patterns—focusing primarily on race and ethnicity, age, gender, geographic region, and health status (e.g., those with chronic diseases). The differences in prevalence are evident, yet the data are not detailed enough to answer many questions about what is taking place within groups or smaller sub-groups. Gaps exist in measures of physical activity, Crespo added. There are degrees of inactivity, and measures of, for example, sedentary activities such as travel, sitting at work, or television watching may not capture differences in the degree of movement that may be significant. In particular, Crespo noted, “we have engineered physical activity out of our jobs,” and the degree of physical activity required for different modes of transportation is not typically viewed as a domain of health. Yet, these are potentially important opportunities for physical activity.

Data Overview

Despite the measurement challenges, a few points are clear, Crespo explained. Current data indicate that during their leisure time, members of most minority groups are more inactive than whites, and women are less active than men (Crespo et al., 2000). The data on occupational physical activity are inconsistent, Crespo added. In general, people who are active at work are more likely to exercise during leisure time, but this pattern does not hold across genders, racial and ethnic groups, and regions. Additionally, as people age they are likely to be less and less active, although rates in this regard vary by ethnicity.

Children are more likely to be obese the more television they watch per day—approximately 18 percent of those who watch 4-5 hours per day are obese, compared with only 8 percent of those who watch 1 hour per day or less (Crespo et al., 2001a). Non-Hispanic black children are the most likely to watch 4 or more hours of television per day—nearly 40 percent do so as compared with 25-30 percent of Mexican American children, approximately 12 percent of non-Hispanic white girls, and approximately 17 percent of non-Hispanic white boys (there is little gender difference for the other two groups). Children tend to take in more calories the more television they watch, Crespo added, with those who watch 5 or more hours per day consuming an average of 150 calories per day more than those who watch 1 hour or less (Crespo et al., 2001a).

Data also indicate that people with less educational attainment engage in less physical activity than those with greater attainment, and here also there is variation by race and ethnicity (Crespo et al., 2000). Looking at men, more than 20 percent of whites, more than 30 percent of blacks, and approximately 40 percent of Mexican Americans who have had fewer

than 12 years of education engage in no leisure-time physical activity; the comparable figures for those with 16 years or more of educational attainment are less than 10 percent of whites and approximately 15 percent of the other two groups. The trends are the same for women, although they are more likely than men at each educational level to report engaging in no leisure-time physical activity. Other data show, however, that as Mexican Americans grow more acculturated (as measured by languages spoken in the home) in the United States, their rates of inactivity decline (Crespo et al., 2001b). On the other hand, inactivity is prevalent across economic classes, Crespo added, with blue-collar workers only modestly more likely to report no leisure-time activity than white-collar or white-collar professional workers (Crespo et al., 2000).

Geographic differences are significant, as Figure 7-7 shows. Adults who live in the Pacific Northwest, for example, are among the least likely to be physically inactive during their leisure time, and those who live in rural areas are more likely than those in urban areas to report no leisure-time physical activity. Activity levels also vary by season, but in different ways for different groups (CDC, 1997).

Measurement Issues

To capture information about the complex nature of physical activity, researchers use both subjective measures (questionnaires and direct observation) and objective measures (e.g., activity monitors, pedometers, indirect calorimetry [to measure calories burned]), but assessments vary in validity and reliability, Crespo explained. “There are multiple ways we move as humans, and we still have rudimentary instrumentation for measuring them,” he explained. The objective measures are accurate, but they are complicated to use, and “all you get are counts,” he added. They reveal nothing about behaviors, and thus are of limited value for the development of policy and program implementation, in Crespo’s view. Moreover, technical issues, such as the challenge of using heart rate to measure physical activity in older people who are taking medication to control cardiac problems, can limit the usefulness of some objective measures for some purposes. Subjective measures have more practical applicability, Crespo suggested, but they do not reflect total energy expenditure and can easily be misinterpreted.

Thus to understand physical activity patterns, it is important to look across groups (for example, gender, age, and race/ethnicity), as well as types of data (for example, calorimetry or questionnaires) for all of those groups. To obtain a complete picture, it is also important to examine results for various age groups with diverse capabilities and to capture the activity that takes place during non-leisure time, such as during transportation and

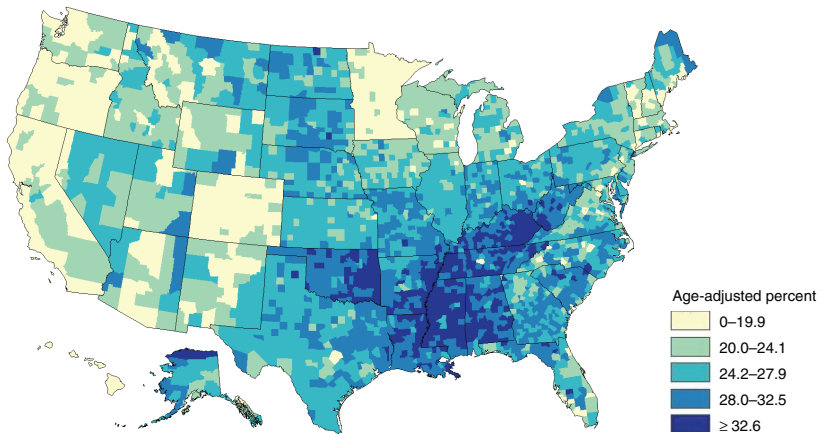


FIGURE 7-7 County-level map for leisure-time physical inactivity among adults aged 20 and older, 2008.

SOURCE: CDC, 2011. See http://apps.nccd.cdc.gov/DDT_STRS2/NationalDiabetesPrevalenceEstimates.aspx?mode=PHY (accessed October 4, 2011).

work, as well as incidental physical activity. If diverse patterns are not captured, Crespo explained, the information will be incomplete. For example, if some groups get much more of their physical activity in the work setting but that activity is particularly difficult to measure, researchers' picture of those groups may be less accurate than that of other groups.

Crespo concluded with several suggested goals for the field. Collecting data at the school level would be a valuable way to expand information about children and youth, in his view, and more community-level data would also be beneficial. Moreover, "we need to be able to better capture physical activity and energy expenditure in the workplace," he observed, and "we need to do a much better job of calculating different types of physical activity in different populations."

THE ROLE OF MARKETING IN DISPARITIES

Presenter: Sonya Grier

Marketing is a system designed to influence consumers' choices and consumption, Grier explained. Marketing shapes awareness of and access to food and beverage products, as well as the prices consumers pay. Marketing strategies tend to focus on particular groups of consumers, and ethnic minorities are attractive target markets, Grier added. They are the fastest-

growing segments of the population, and their buying power has been increasing. Surveys of advertising agencies and food marketing companies indicate that multicultural marketing is a high priority for these groups, so understanding this influence is important for researchers.

Marketers work from the characteristics of the groups they are targeting, Grier noted. Thus, for example, they know that black and Hispanic youth are particularly reachable through television advertising because they spend so much time in this activity. These groups of young people are also regarded as trendsetters in the marketplace, so marketers see them as a means of targeting other groups. Marketers know how to reach groups locally (e.g., using billboards) as well as nationally, through television and the Internet.

Research suggests that targeted marketing may predispose minority consumers to poor-quality diets and also limit the effectiveness of general prevention initiatives, Grier noted (Grier and Kumanyika, 2008). Marketers use research to identify groups that are both homogeneous and distinct from other groups, and select them as targets. They “position” products to appeal to such groups using design features (type of food, packaging, portion size); price (actual or relative); placement in retail outlets; and promotion (sampling, cross-promotion, and links to social causes) (Grier and Kumanyika, 2010). Other tools for targeting ethnic minorities, Grier noted, include event sponsorship, cultural symbols, product placement in movies and songs, street teams, giveaways, websites, mobile marketing, social networking, and custom products.

Each of these tools is effective on its own, Grier added, but the combination is “greater than the sum of the parts.” Through their research, companies understand quite well who their consumers are and what they need, Grier noted. For example, the dollar menu was a strategy based on research that suggested a need for low-cost food in particular communities. “The dollar menu appeals to lower-income ethnic consumers. It’s people who don’t always have \$6 in their pocket,” a vice president for U.S. business research at McDonald’s has been quoted as saying (Warner, 2006). Such marketing is not new, Grier added. A 1930s article discussed new urban consumers—meaning African Americans—who could be targeted. This example illustrates that marketing is linked to complex issues such as civil rights—“the right to be a consumer,” Grier suggested.

Identifying the causal chain linking such marketing practices to health outcomes is challenging, Grier explained. Measuring the “marketing mix” targeting particular groups is a challenge—there are no standardized measures of differential targeted marketing. To understand the big picture, Grier explained, multiple perspectives need to be considered. Marketers are focused on their own brands and on how to get people to buy them. Consumers are thinking about their own desires and how to handle the

information and messages they are receiving. It is policy makers who take an aggregate view and think about multiple buyers, sellers, and groups, as well as such issues as fairness and accuracy. The complexity of the picture, Grier added, is likely one reason why standardized measures do not exist in this area.

Research

Grier and Kumanyika (2010) suggest some types of evidence that would be useful for assessing the influence of targeted marketing on disparities and health. First, one would want to know whether a given product is harmful, although that seemingly simple question is controversial given prevailing advice that any food, in moderation, could be part of a balanced diet. Second, one would want to know whether a particular group is the target of excessive marketing and whether that exposure is influencing the group's behavior.

With these questions in mind, Grier and Kumanyika conducted a systematic review of the marketing environments of African American consumers, looking particularly at whether they are more likely than white consumers to be targeted by marketing of unhealthy foods (Grier and Kumanyika, 2008). Because marketing, food access, and other important aspects of the issue generally are studied in different venues, they reviewed empirical research from a variety of disciplines published from 1992 to 2006, using eight databases that cover economics, sociology, business, medicine, and related fields. They found 20 relevant interdisciplinary articles: 8 on product promotions, 11 on food distribution, and 3 on food prices.

These studies used diverse methods and measures, including content analysis of advertising and in-store promotion (e.g., promotion of healthy versus unhealthy products and the ethnicity of product endorsers); spatial and statistical analysis of retail food outlet locations and prices using geographic information system (GIS) and secondary data (e.g., comparisons of travel distances to certain types of outlets in different neighborhoods); market basket studies, market inventories, and menu audits within retail food outlets; and community-based participatory research. By linking this range of information, the researchers hoped to gain a comprehensive picture of the marketing environment.

Grier and Kumanyika found that across these studies, with their diverse approaches, the findings showed a great deal of consistency. The studies of product promotion demonstrated that low-cost, low-nutrition products such as candy, soda, and snacks were the predominant subjects of promotion to low-income neighborhoods and those with primarily minority populations. Positive nutritional messages were a smaller proportion of food marketing for these groups than for white or mainstream audiences. Other

studies showed that predominantly black neighborhoods had fewer supermarkets and healthy food options than predominantly white neighborhoods and a higher density of fast-food restaurants, even though food prices might be somewhat higher on average (because of distribution and other issues).

There were limitations to the data reviewed, Grier noted, which help identify areas in which further research is needed. Much of the data is cross-sectional, and socioeconomic status was frequently confounded with race in these studies. Moreover, there was a greater focus on advertising and distribution than on price, which is also important, Grier added. These limitations meant that it was challenging to assess the validity, reliability, and representativeness of these 20 diverse studies.

A new study by the Federal Trade Commission will provide a view of marketing strategies for food and beverages.³ For this study, researchers are examining materials supplied by 48 companies—including expenditure records, samples of marketing activities, and research studies—related to targeted marketing of foods to children (ages 2 to 11) and adolescents (ages 12 to 18). The researchers are looking at product placement, content (e.g., use of cartoon characters or celebrities), and whether any of the companies targeted messages about healthy diets to young people. They are considering digital advertising, word of mouth, and the use of philanthropy (e.g., corporate sponsorships), and they are also examining marketing that targets subgroups defined by gender, race, ethnicity, or income (see Box 7-1 for a partial list of measures used in this study).

Discussion

Grier explained that it is important to ask how consumers respond to such marketing, and existing research suggests that ethnic minority consumers tend to respond more favorably than their white peers (Aaker et al., 2000). She suggested that the reasons have to do with the fact that being a member of a minority group (even if the group has social minority status but is not necessarily a minority in the numeric sense) makes people more likely to identify with distinctive traits or personalities they associate with their group, and thus respond more favorably to targeted advertising.

It may also be, Grier added, that ethnic minority consumers respond to nontargeted advertising differently as well. It has been suggested that members of minority groups may tend to seek traits relevant to them in response to a wider context in which members of their own group are not well represented. On the other hand, Grier noted in response to a question, population subgroups are not homogeneous, and prevalent attitudes may

³See http://www.ftc.gov/os/6b_orders/foodmktg6b/P094511/P094511order.pdf (accessed September 30, 2011).

BOX 7-1
**Sample Measures Used in the Federal Trade Commission's
Study of Food Marketing to Youth**

- Television, radio, and print advertising
- Company-sponsored Internet sites
- Other digital advertising
- Packaging and labeling
- Movie theater/video/video game advertising
- In-store advertising and product promotions
- Specialty item or premium distribution (items other than food products that are distributed in connection with the sale of food products, such as a toy)
- Sponsorship of public entertainment events
- Product placements
- Character licensing, toy co-branding, and cross-promotions
- Sports sponsorship
- Word-of-mouth and viral marketing
- Celebrity endorsements
- In-school marketing
- Advertising via philanthropic endeavors

shift over time. Survey results are somewhat mixed, she added, and there have been no nationally representative studies of how people perceive and react to targeted marketing. A participant suggested that it is important to consider that the products being marketed may play different roles in the lives of different populations. While nutrition researchers think poorly of fast-food restaurants, for example, they can provide play spaces, places to congregate, and employment within their neighborhoods, and community members may value them and their products in ways that research does not capture.

One participant asked whether there is clear evidence that targeted marketing results directly in obesity, and another asked whether targeted marketing of healthful behaviors could work as well as the marketing of unhealthy foods appears to work. In response, Grier and Kumanyika suggested it is clear that the pervasiveness of targeted marketing makes preventing obesity difficult. Thus, any counter advertising must address that competitive environment. It is an uphill battle, Grier noted. “While advertising [of healthy alternatives] might create awareness, marketing [of unhealthy products] might be used to reinforce norms and help maintain current behavior—so that’s what you’re competing against.” Kumanyika noted the difficulty of reaching people with messages or interventions

regarding healthy foods when a higher proportion of what is available and what is advertised are products that are not recommended.

Thus, Grier concluded, there are many measures for understanding consumer behavior. The challenge, in her view, is to take the research further to explore factors that may contribute to the demand for unhealthy foods and how habitual environments may shape that demand. At the same time, researchers must keep pace with new marketing tools, particularly digital media. For example, consumers who use mobile electronic devices can now be “hypertargeted” using geolocation technology. Grier showed an example in which messages in Spanish sent only to Hispanic consumers within a particular zone in New York City guided them to a nearby McDonald’s outlet for a promotion directly targeting them. Apart from the challenge of measuring the influence of such finely targeted marketing, a participant noted, new technologies complicate the research goal of comparing “apples to apples”—already a challenge when products, brands, and advertising evolve so rapidly. More broadly, Grier added, the challenge is to measure the “synergistic and cumulative effects” of these influences at the individual, community, society, and national levels.

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8

Summary of Workshop Themes

Robin McKinnon, a health policy specialist in the Risk Factor Monitoring and Methods Branch at the National Cancer Institute, was asked to summarize the primary themes from the workshop as its final presentation. This chapter integrates her remarks with a brief overview of a few key points from the workshop presentations and discussions.

McKinnon reminded participants that the workshop’s purpose was twofold,

- to explore the ways in which measurement techniques, strategies, and data sources can impede or accelerate progress toward preventing obesity; and
- to explore what additional knowledge of environments and policies is needed to assess progress toward obesity prevention.

McKinnon noted that “people used the term ‘measures’ to mean many different things” in the course of the workshop—for example, as (1) methods of assessment, such as survey instruments or policy audit tools; (2) techniques, such as cost-effectiveness analysis; (3) strategies/indicators, such as number of supermarkets per population; and (4) data sources, such as surveillance systems or databases. She observed that greater clarity in the use and awareness of terminology could be helpful.

AN ECOLOGICAL APPROACH

Many of the presenters offered illustrations of individual-level energy-balance behavior embedded within a nested set of influences, including the home, organizations, and the physical and policy environments. Presenters focused in detail on different aspects of the food environment and the built environment for physical activity and their influences on energy balance, but it is also necessary to consider the broader picture. What people consume appears to be influenced by a wide array of factors, including availability and convenience, food and nutrition knowledge, agricultural policies, economic incentives, marketing messages, family and cultural customs and preferences, and individual physiology. How and when people engage in physical activity is influenced by many of the same factors, and by the nature of the built environment where they live and work, their public transportation options, and more. Presenters made clear that the various influences on energy balance are important, although they may be difficult to isolate. Furthermore, several presenters emphasized that sectors that may appear to be unrelated to health actually may be relevant and important to efforts to reduce obesity rates.

PROGRESS AND GAPS IN AVAILABLE MEASURES

Measurement strategies and techniques are a critical foundation for research, McKinnon observed, adding that a study may be well-designed and data rigorously analyzed, but if the basic measures, the assessment tools, are not valid and reliable, true associations between exposures and outcomes may not be understood. A relatively recent review of measures of the food and physical activity environments notes that although much progress has been made, further progress is needed (McKinnon et al., 2009). For example, it suggests that refinement of the measurements of environments in low-income and high-risk communities is needed, as are increased rates of validity and reliability testing and/or reporting. Progress since that report was published includes advancement and refinement in geographic analyses, as well as improvements in measures of the food and physical activity environments. The number of studies assessing the association between the food environment and health and dietary behaviors, in particular, has increased substantially in recent years. Nonetheless, there is still a relative paucity of measures with which to systematically measure policies and policy change.

The workshop presentations reflected both these issues and this progress. McKinnon observed that fairly good individual-level measures of diet and physical activity exist, and that environmental measures in these areas are developing that use, for example, surveys, geographic information systems (GIS), diaries, or universal product code (UPC) scanning.

Improvements for these measures include more validity testing and reporting (particularly with subpopulations of interest) and the reporting of both perceived and objective environmental measures. Some policy assessment methods exist, but they are often time-intensive, legislation language can be difficult to interpret, and enactment of a policy does not always equal implementation.

MEASUREMENT TECHNIQUES AND METHODS

McKinnon recapped measurement techniques and methods presented at the workshop, and reiterated the importance of choosing a study design that focuses on answering the right questions. Measurement techniques included survey instruments, GIS, and diaries, as noted above. Methods included health impact assessment and economic methods. McKinnon provided additional context when summarizing the portion of the workshop covering those methods.

The impact of obesity on health and related costs is great. It has been estimated that 14 to 20 percent of cancer deaths are attributable to obesity (Calle et al., 2003), and the link between obesity and many other diseases, such as type II diabetes and cardiovascular disease, is well established. Obesity is estimated to be responsible for \$147 billion in health care costs annually (Finkelstein et al., 2009). Researchers also have estimated that increased obesity rates are responsible for 27 percent of the rise in health care costs (Thorpe et al., 2004), having a greater impact than either smoking or problem alcohol consumption (Sturm, 2002). There are other costs of obesity to society as well, resulting from increased disability and absenteeism and reduced productivity (Finkelstein et al., 2005). It may be important to remind the public health community that there are other outcomes of interest besides health. Cost/benefit analysis can show that health, health care, and related costs are not the only outcomes to consider, and also that interventions may have unexpected associated costs and benefits. On the other hand, as discussed in Chapter 4, the claim that reducing obesity rates will reduce overall costs may be questioned. The public health community might benefit instead from analysis of value (in terms of health outcomes) for money spent that can be used to compare the effectiveness of one intervention versus another.

DATA SOURCES

Partner organizations that reach a broad array of audiences and communities may be helpful in gathering data, as well as disseminating results. Data and policies from the worlds of transportation, urban planning, parks and recreation, and many other sources are important to obesity research-

ers. Several presenters noted the value of encouraging the view that questions about public health and obesity prevention in particular should be folded into policy thinking in a variety of areas and data collection across multiple disciplines and levels. Many speakers highlighted the importance of using both quantitative and qualitative data.

Comprehensive surveillance systems and databases are especially important because of the increasing focus on supportive environments and policies for improved diet and physical activity behavior. There are good examples of such systems in the areas of tobacco control and alcohol policy. Policy tracking databases exist, but no surveillance systems currently are in place with which to address all of the most important obesity questions. For example, no such comprehensive system exists for assessing the physical activity environment, as presenters pointed out, nor is there a national system for cataloguing local policies related to the food and physical environments.

Food marketing research produces a wealth of data that public health researchers may be able to use to understand the quantity and content of food and beverage advertisements to which people are exposed, their access to different food products, and other important questions. However, potentially helpful commercially available data sources are often costly, and thus researchers frequently are limited in their access to such data. Furthermore, communication between the food marketing and public health communities regarding these research data is not well established. One way to move forward in this area might be to encourage the commercial data sources to incorporate public health data and the gathering of those data within their systems.

MOVING FORWARD

With this quick snapshot of highlights from the workshop as a backdrop, McKinnon outlined her suggestions for moving forward. She reminded the audience that racial and ethnic minorities are at a higher risk for obesity, and as speakers had noted that marketers and food companies appear to target these groups, adapting measures to evaluate the impact of this marketing appears to be an important priority. Researchers need to find ways to capture the synergistic and cumulative effects of marketing that takes many forms and yet may target small segments of the population. Using qualitative as well as quantitative methods may be particularly helpful in developing measures for communities at highest risk.

McKinnon reiterated her support for Dr. Krebs-Smith's observation regarding the importance of matching the measures and methods to the questions of interest and suggested some steps toward that end:

- Determine the exposures and outcomes of greatest interest using, for example, expert recommendations from the Centers for Disease Control and Prevention and the Institute of Medicine as starting points.
- Assess existing measurement techniques, measures (assessment methods), strategies, and data sources. The National Collaborative on Childhood Obesity Research's Measures Registry and Catalogue of Surveillance Systems may be helpful resources in this regard.
- Identify gaps (such as the lack of a survey of public health policies, the lack of measures tailored to racial and ethnic minorities, and the lack of measures of consumers' responses to marketing), and establish priorities. McKinnon presented a possible model for prioritizing future work, shown in Figure 8-1. She suggested that the focus should be on measures that are anticipated to have high impact but are relatively easy to implement. Measures with high impact and high implementation costs might also be a focus, but measures anticipated to have low impact should not have priority.
- Identify partners from beyond the public health sector, including the transportation and urban planning communities, and identify the necessary strategies for collaboration.
- Focus on and promote study designs that emphasize answering the right questions.
- Evaluate results, and disseminate them widely.

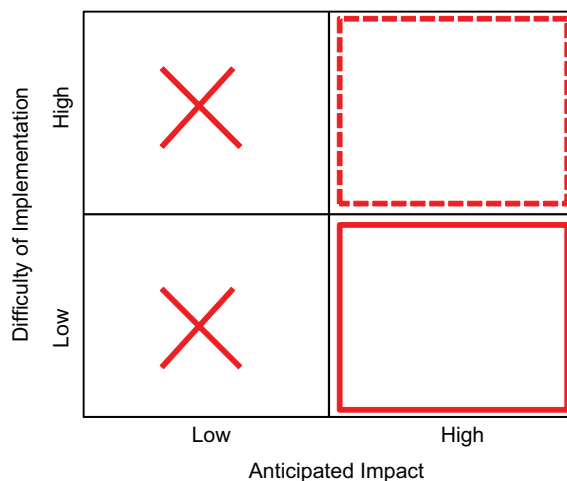


FIGURE 8-1 Possible model for setting priorities for filling gaps in measures.
SOURCE: McKinnon, 2011.

McKinnon closed by saying, “Let’s not measure simply what’s easiest and most convenient. Let’s focus on the areas of greatest need and anticipated impact.”

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A

Workshop Agenda

WORKSHOP ON MEASUREMENT STRATEGIES FOR ACCELERATING PROGRESS IN OBESITY PREVENTION

Arnold and Mabel Beckman Center of the National Academies
100 Academy Way, Irvine, CA
March 23-24, 2011

- PURPOSE**
- (1) Explore and understand the ways that measurement techniques, strategies, and data sources can impede and/or promote acceleration of progress toward prevention of obesity.
 - (2) Understand what additional knowledge regarding assessments of environments and policies is needed to measure progress in obesity prevention.

DAY 1: WEDNESDAY, MARCH 23

- 12:00 pm** **Welcome and Opening Remarks**
William Purcell, Harvard University*
- 12:15** **PANEL I: The Physical Activity, Inactivity, and Built Environments: Current and Potential Sources of Measures for Assessing Progress in Obesity Prevention**
Moderator: *Bill Kohl,* University of Texas School of Public Health and University of Texas, Austin*
Speakers:
James F. Sallis, San Diego State University
Christine Hoehner, Washington University

*Member of the IOM Committee on Accelerating Progress in Obesity Prevention.

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MEASURING PROGRESS IN OBESITY PREVENTION

1:30 **PANEL II: The Food and Nutrition Environments: Current and Potential Sources of Measures for Assessing Progress in Obesity Prevention**

Moderator: *Steven H. Kelder,* University of Texas School of Public Health–Austin*

Speakers:

Karen Glanz, University of Pennsylvania

Susan M. Krebs-Smith, National Cancer Institute

2:45 BREAK

3:00 **PANEL III: Cross-Cutting Issues: Current and Potential Sources of Measures for Assessing Progress in Obesity Prevention**

Moderator: *Patricia B. Crawford,* University of California, Berkeley*

Speakers:

Robert M. Malina, University of Texas, Austin, and Tarleton State University

Robin McKinnon, National Cancer Institute

Roland Sturm, RAND

4:30 ADJOURN

DAY 2: THURSDAY, MARCH 24

8:30 am Welcome and Recap of Day 1
William Purcell, Harvard University*

8:45 **PANEL IV: Marketing and Industry Measures and Evaluations**

Moderator: *Ellen Wartella,* Northwestern University*

Speakers:

Victoria Rideout, VJR Consulting*

Shu Wen Ng, University of North Carolina, Chapel Hill (via web)

Robert C. Hornik, University of Pennsylvania (via web)

10:15 BREAK

- 10:30** **PANEL V: State and Community Reach**
Moderator: *Eduardo J. Sanchez,* Blue Cross and Blue Shield of Texas*
Speakers:
Maya Rockey Moore, Global Policy Solutions and Leadership for Healthy Communities
Laura Kettel Khan, Centers for Disease Control and Prevention
Amy A. Eyler, Washington University (via web)
Jamie Chriqui, University of Illinois, Chicago*
Brian Cole, University of California, Los Angeles
- 12:45 pm** **LUNCH**
- 1:45** **PANEL VI: Disparities and Measurement**
Moderator: *Shiriki Kumanyika,* University of Pennsylvania*
Speakers:
Sarah Samuels, Samuels & Associates
Carlos J. Crespo, Portland State University
Sonya Grier, American University
- 3:30** **BREAK**
- 3:40** **CLOSING SESSION: Themes of the Workshop and Next Steps**
Speaker:
Robin McKinnon, National Cancer Institute
- 4:00** **ADJOURN**

B

Biographical Sketches of Committee Members

Daniel R. Glickman, J.D. (*Chair*) is executive director of congressional programs at The Aspen Institute in Washington, DC. He is also senior fellow at The Bipartisan Policy Center. He previously served as president of Refugees International and chairman and chief executive officer of the Motion Picture Association of America (MPAA). Prior to joining the MPAA in September 2004, Mr. Glickman was director of the Institute of Politics at Harvard University's John F. Kennedy School of Government (August 2002-August 2004). He served as the 26th U.S. Secretary of Agriculture from March 1995 until January 2001. During his tenure, improving the nation's diet and nutrition and fighting hunger were among the department's priorities. Before his appointment as Secretary of Agriculture, Mr. Glickman served for 18 years in the U.S. House of Representatives, representing Kansas's 4th Congressional District. During his time in Congress, he was a member of the House Agriculture Committee, including 6 years as chairman of the subcommittee with jurisdiction over federal farm policy issues; nutrition policy; the Food Stamp Program; the National School Lunch Program and other child nutrition programs; and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). He also served as chairman of the House Permanent Select Committee on Intelligence. Mr. Glickman is co-chair of the Chicago Council on Global Affairs' Global Agricultural Development Initiative and vice chairman of World Food Program USA (formerly the Friends of the World Food Program). His service includes membership on the board of directors of the American Film Institute, CME Group, Communities in Schools, the Food Research and Action Center, the National 4-H Council, the William Davidson Institute at the University of

Michigan, and the Center for U.S. Global Engagement. He is a member of the Council on Foreign Relations and the Council on American Politics at the Graduate School of Political Management at The George Washington University, and a senior fellow of the Center on Communication, Leadership, and Policy at the USC Annenberg School for Communication and Journalism. In addition, Mr. Glickman is a co-chair of AGree, a multi-foundation effort to review long term food and agricultural policy. Mr. Glickman received his B.A. in history from the University of Michigan and his J.D. from The George Washington University. He is a member of the Kansas and District of Columbia Bars.

M. R. C. Greenwood, Ph.D. (*Vice Chair*) is president of the University of Hawaii System, a position she assumed in 2009. Previously, Dr. Greenwood was professor of nutrition and internal medicine, chair of the Graduate Group in Nutritional Biology, and director of the Foods for Health Initiative at the University of California, Davis. She served as chancellor of the University of California, Santa Cruz, from 1996 to 2004 and as University of California provost and senior vice president for academic affairs. Prior to her Santa Cruz appointments, Dr. Greenwood was dean of graduate studies, vice provost of academic outreach, and professor of biology and internal medicine at the University of California, Davis. Previously, she was chair of the Department of Biology at Vassar College. From 1993 to 1995, Dr. Greenwood served as associate director for science at the Office of Science and Technology Policy in the Executive Office of the President of the United States. She is the author of numerous scientific publications in the areas of nutrition, obesity, and diabetes. Dr. Greenwood is past president and fellow of the American Association for the Advancement of Science, fellow of the American Academies of Arts and Sciences, and past president of the North American Association for the Study of Obesity. She is past chair of the IOM's Food and Nutrition Board, the NRC Policy and Global Affairs Committee, and the IOM Committee on Dietary Supplement Use by Military Personnel, and is a former member of the National Science Board. Dr. Greenwood received her A.B., summa cum laude, from Vassar College and her Ph.D. from The Rockefeller University. She is a member of the IOM.

William Purcell, III, J.D. (*Vice Chair*) is an attorney in Nashville, Tennessee, who most recently served as special advisor on Allston and co-chair of the Work Team for Allston in the Office of the President at Harvard University. From 2008 until 2010, he served as director of the Institute of Politics at the Kennedy School of Government at Harvard. Previously, Mr. Purcell was mayor of Nashville, Tennessee, from 1999 to 2007. Mr. Purcell's accomplishments as a civic leader earned him Public Official of the Year honors in 2006 from *Governing Magazine*. In 1986 he was elected

to the Tennessee House of Representatives, where he served for five terms, serving in the positions of majority leader and chair of the Select Committee on Children and Youth. After retiring from the General Assembly, he founded and became director of the Child and Family Policy Center at the Vanderbilt Institute of Public Policy Studies. Mr. Purcell was a member of the IOM Committee on an Evidence Framework for Obesity Prevention Decision Making. He graduated from Hamilton College and Vanderbilt University School of Law.

David V. B. Britt, M.P.A., is retired president and chief executive officer of Sesame Workshop. Mr. Britt's professional experience includes executive positions with the U.S. Agency for International Development, the Equal Employment Opportunity Commission, and the Overseas Private Investment Corporation. Since his retirement, Mr. Britt has been engaged in consulting and leadership development for nonprofit organizations. He is currently chair of the board of directors of The Education Trust. Mr. Britt has been a member of the Advisory Board on Social Enterprise at the Harvard Business School, and is a member of the Council on Foreign Relations and the Board of INMED Partnerships for Children. He is a former member of the Institute of Medicine (IOM)/National Research Council (NRC) Board on Children, Youth, and Families. He previously served as a member of the IOM Committee on Obesity Prevention Policies for Young Children and the IOM Committee on Food Marketing and the Diets of Children and Youth. He received a B.A. from Wesleyan University and an M.P.A. from the John F. Kennedy School of Government at Harvard University.

Jamie F. Chriqui, Ph.D., M.H.S., is senior research scientist and director of policy surveillance and evaluation in the Health Policy Center within the Institute for Health Research and Policy at the University of Illinois at Chicago (UIC) and research associate professor in political science at UIC. She has more than 21 years' experience conducting public health policy research, evaluation, and analysis, with an emphasis on obesity, substance abuse, tobacco control, and other chronic disease-related policy issues. Dr. Chriqui has led a number of efforts to develop quantitative measures of the extensiveness of state- and local-level public health policies. Her research interests focus on examining the impact of law and policy on community and school environments as well as individual behaviors and attitudes. Her current research focuses on sugar-sweetened beverage taxation, school district wellness policies, and community policies related to the physical activity and food environments. She directs all state, local and school district policy research activities for the Robert Wood Johnson Foundation-supported Bridging the Gap program and is principal investiga-

tor or co-investigator on several NIH-funded research grants. She serves on numerous obesity-related advisory and expert panels and is widely called upon for her expertise in obesity policy-related issues. Before joining UIC, Dr. Chriqui served as technical vice president of the Center for Health Policy and Legislative Analysis at The MayaTech Corporation and prior to that as a policy analyst at the National Institute on Drug Abuse. She holds a B.A. in political science from Barnard College at Columbia University; an M.H.S. in health policy from the Johns Hopkins University School of Hygiene and Public Health; and a Ph.D. in policy sciences (health policy concentration) from the University of Maryland, Baltimore County.

Patricia Crawford, Dr.P.H., R.D., is director of the Dr. Robert C. and Veronica Atkins Center for Weight and Health, Cooperative Extension nutrition specialist in the Department of Nutritional Science and Toxicology, and adjunct professor in the School of Public Health at the University of California, Berkeley. Dr. Crawford directed the longitudinal National Heart, Lung, and Blood Institute Growth and Health Study, a study of the development of cardiovascular risk factors in African American and white girls, as well as the Five-State FitWIC Initiative to Prevent Childhood Obesity. She has developed numerous obesity prevention materials, including the Fit Families novella series for Latino families and Let's Get Moving, an activity program for those who work with young children. She has served on a number of advisory committees including the California Legislative Task Force on Diabetes and Obesity. Dr. Crawford's current studies include evaluations of large community-based obesity initiatives and school-based policy interventions. She is a member of the IOM Standing Committee on Childhood Obesity Prevention and has served as a member or chair of three IOM obesity-related planning committees. She earned a B.S. from the University of Washington and a doctorate in public health and an R.D. from the University of California, Berkeley.

Christina Economos, Ph.D., is associate professor of nutrition and New Balance Chair in Childhood Nutrition at the Friedman School of Nutrition Science and Policy at Tufts University. She also serves as director of ChildObesity180. Her research focuses on the interactions among exercise, diet, and body composition. Her translational research includes theory-based obesity prevention interventions with ethnically and socioeconomically diverse children, adolescents, and their families in urban and rural communities across the United States. Dr. Economos was principal investigator for the Shape Up Somerville (SUS) project and currently leads several large obesity prevention intervention trials. The SUS project targeted behavior change in children through community-based, environmental change in a low-income, racially/ethnically diverse population. Dr. Economos has

held positions in public health nutrition, including at the Massachusetts Department of Public Health. She serves on numerous state and national advisory boards. She was a consultant on the Youth Subcommittee for the 2008 Physical Activity Guidelines and is a member of the Public Policy Committee of the American Society for Nutrition. Dr. Economos served as a member of the IOM Committee on an Evidence Framework for Obesity Prevention Decision Making. She earned her M.S. at Columbia University and her Ph.D. at the Friedman School for Nutrition Science and Policy at Tufts University.

Sandra G. Hassink, M.D., began the Pediatric Weight Management Clinic at A.I. duPont Hospital for Children in Wilmington, Delaware, in 1988. The clinic is part of the Division of General Pediatrics; it uses a multidisciplinary, family-based approach to obesity and cares for children from infancy to young adulthood. Dr. Hassink is now director of the Nemours Obesity Initiative. She works both in the clinical division treating obese pediatric patients and in Nemours Health and Prevention Services, and has served as clinical consultant for the Primary Care Quality Collaborative on childhood obesity and in helping to develop obesity-related policy at the community and state levels. Dr. Hassink has collaborated in basic research efforts to identify pathophysiologic mechanisms of obesity, centering on the role of leptin, and has lectured widely in the field of pediatric obesity. In addition to her other responsibilities, she currently chairs the ethics committee at A.I. duPont Hospital for Children. Dr. Hassink serves on the board of directors of the American Academy of Pediatrics (AAP), has been a member of the AAP Task Force on Obesity, and is currently chair of the AAP Obesity Leadership Workgroup. She is the author of *A Parent's Guide to Childhood Obesity; Pediatric Obesity: Prevention, Intervention, and Treatment Strategies for Primary Care*; and *Clinical Guide to Pediatric Weight Management*. Dr. Hassink received her medical degree from Vanderbilt Medical School and a master's degree in pastoral care and counseling from Neumann College.

Anthony B. Iton, M.D., J.D., is senior vice president for healthy communities at The California Endowment in Oakland. In this role, he directs the foundation's 10-year Building Healthy Communities: California Living 2.0 initiative, an effort to create communities where children are healthy, safe, and ready to learn. Prior to assuming this role, Dr. Iton served as both health officer and director of the Public Health Department for Alameda County (Oakland, California), beginning in 2003. There he oversaw the creation of an innovative public health practice designed to eliminate health disparities by tackling the root causes of poor health commonly found in California's low-income communities. Dr. Iton also served for 3 years as

director of health and human services and school medical advisor for the City of Stamford, Connecticut. Concurrently he served as a physician in internal medicine for Stamford Hospital's HIV clinic. He also has served as a primary care physician for the San Francisco Department of Public Health. Dr. Iton's work has been published in numerous public health and medical journals, and he is a regular public health lecturer and keynote speaker. He earned his B.S. in neurophysiology from McGill University, his M.D. from the Johns Hopkins University School of Medicine, and his J.D. from the University of California, Berkeley.

Steven H. Kelder, Ph.D., M.P.H., is Beth Toby Grossman Distinguished Professor in Spirituality and Healing and co-director of the Michael & Susan Dell Center for Healthy Living at the University of Texas School of Public Health in Austin. Dr. Kelder has directed National Institutes of Health (NIH)- and Centers for Disease Control and Prevention (CDC)-funded research projects focused on developing and evaluating school-based programs that address risk behaviors among children and adolescents in order to reduce chronic disease, and include promotion of healthy eating and physical activity and prevention of tobacco use and osteoporosis. He has been a principal investigator directing efforts to disseminate the CATCH program, which has been adopted by elementary schools nationwide, including more than 2,500 elementary schools in Texas, potentially reaching more than 1,000,000 Texas children. Dr. Kelder has authored or co-authored numerous scientific papers and book chapters over the past 15 years addressing the design and analysis of epidemiological studies and health promotion interventions. He teaches graduate courses in epidemiology, social and behavioral aspects of behavior change, community nutrition education, epidemiology of child and adolescent health, and obesity and public health. Dr. Kelder received his Ph.D. in behavioral epidemiology and M.P.H. in community health education from the University of Minnesota, and a B.S. in marketing and economics from Northern Illinois University.

Harold W. (Bill) Kohl, III, Ph.D., M.S.P.H., is professor of epidemiology and kinesiology at the University of Texas Health Science Center Houston, and in the Department of Kinesiology and Health Education at the University of Texas, Austin, College of Education. Dr. Kohl is also faculty at the Michael & Susan Dell Center for Healthy Living in Austin. He is the founder and director of the University of Texas Physical Activity Epidemiology Program, where he is responsible for student training, research, and community service related to physical activity and public health. His previous service includes directing physical activity epidemiology and surveillance projects in the Division of Nutrition, Physical Activity, and Obesity at the Centers for Disease Control and Prevention. Dr. Kohl's research

focuses on epidemiology related to physical inactivity and obesity in both adults and children. Dr. Kohl also studies the effect of the built environment on physical activity and is currently researching a planned development that implements “smart growth” techniques that support physically active lifestyles. He received an M.S.P.H. from the University of South Carolina School of Public Health in epidemiology and biostatistics and a Ph.D. from the University of Texas Health Science Center, Houston School of Public Health, in community health studies.

Shiriki K. Kumanyika, Ph.D., M.S.W., M.P.H., R.D., is professor of epidemiology in the Department of Biostatistics and Epidemiology and Pediatrics (Gastroenterology, Nutrition Section) and associate dean for health promotion and disease prevention at the University of Pennsylvania Perelman School of Medicine. Dr. Kumanyika’s interdisciplinary background integrates epidemiology, nutrition, prevention, minority health, and women’s health issues across the life course. The main themes of her research have concerned the role of nutritional factors in the primary and secondary prevention of chronic diseases, with a particular focus on obesity, sodium reduction, and related health problems such as hypertension and diabetes. She has a particular interest in the epidemiology and prevention of obesity among African Americans. Dr. Kumanyika has served on numerous national and international advisory committees and expert panels related to nutrition and obesity. She is co-chair of the International Obesity Task Force, the policy and advocacy arm of the International Association for the Study of Obesity, and serves as a consultant to the World Health Organization’s Department of Nutrition for Health and Development. Dr. Kumanyika served as a member of the IOM Food and Nutrition Board, chair of the IOM Committee on an Evidence Framework for Obesity Prevention Decision Making, and a member of the IOM Committee on Prevention of Obesity in Children and Youth. She is currently chair of the IOM Standing Committee on Childhood Obesity Prevention. She received a B.A. from Syracuse University, an M.S.W. from Columbia University, a Ph.D. in human nutrition from Cornell University, and an M.P.H. from the Johns Hopkins University. She is a member of the IOM.

Philip A. Marineau, M.B.A., is operating partner with LNK Partners, a private equity firm in White Plains, New York. Mr. Marineau also is currently chairman of the Board of Shutterfly, an online photo sharing and greeting card company, and holds numerous other board positions, including positions with Kaiser Permanente, the Meredith Corporation, and Georgetown University. At LNK Partners, Mr. Marineau’s experience guides the firm’s investments, which are exclusively in the consumer and retail sector. He has had a 33-year career working in the major name brand consumer retail

business. Mr. Marineau was president of Quaker Oats, where he worked for 23 years. Thereafter, he served as president of Dean Foods, a dairy company, from 1996 to 1997. He then served as president of Pepsi-Cola North America, from 1997 to 1999, and then as president and chief executive officer of Levi Strauss, the global apparel company, from 1999 to 2006. Mr. Marineau received his M.B.A. from Northwestern University and his B.A. in history from Georgetown University.

Victoria Rideout, M.A., is president and founder of VJR Consulting, a private consulting firm specializing in media research and social marketing strategy. Until 2010 she served as vice president of the Kaiser Family Foundation and director of the foundation's Program for the Study of Media and Health. Ms. Rideout directed more than 30 studies on topics concerning media and health, including a 10-year study tracking the evolving nature of media use among children and youth, research quantifying the amount and nature of food advertising to children on television and the Internet, surveys on teenagers' use of the Internet for health information, content analyses of public service advertising on television, and several studies documenting the positive influence of health-related content in entertainment television. Her research has been published in peer-reviewed journals such as the *Journal of the American Medical Association*, *Pediatrics*, the *Journal of Public Policy and Marketing*, *Health Affairs*, and *American Behavioral Scientist*, and has been widely reported in the news media. Ms. Rideout has also negotiated partnerships with the television networks MTV, BET, and UPN, securing high-profile, multi-million-dollar donations of media time to conduct youth-oriented public education campaigns. The public service ads, original long-form programming, and online content she helped develop through these partnerships received many awards, including a National Emmy Award for best public service campaign. Ms. Rideout received a B.A. from Harvard University and an M.A. from the Maxwell School of Public Affairs at Syracuse University.

Eduardo J. Sanchez, M.D., M.P.H., FAAFP, is vice president and chief medical officer for Blue Cross and Blue Shield of Texas (BCBSTX). He previously served as director of the Institute for Health Policy at the Austin Regional Campus of the School of Public Health in the University of Texas Health Science Center at Houston; prior to that, he served as commissioner of the Texas Department of State Health Services. As commissioner and chief health officer for the State of Texas, Dr. Sanchez led a statewide, comprehensive obesity prevention initiative and oversaw the creation of the 2006 Texas Obesity Policy Portfolio and the release of a Texas obesity cost projection comparing 2000 with 2040. He also oversaw Texas's behavioral health programs, disease prevention and bioterrorism preparedness pro-

grams, family and community health services programs, and environmental and consumer safety and health-related regulatory programs. He practiced clinical medicine in Austin from 1992 to 2001 and served as health authority and chief medical officer for the Austin-Travis County Health and Human Services Department from 1994 to 1998. He served as chair of the IOM Committee on Childhood Obesity Prevention Actions for Local Governments, and as a member of the IOM Committee on Progress in Preventing Childhood Obesity and the IOM Committee on a Comprehensive Review of the DHHS Office of Family Planning Title X Program. He is a current member of the IOM Standing Committee on Childhood Obesity Prevention. Dr. Sanchez received his M.D. from the University of Texas Southwestern Medical School in Dallas, an M.P.H. from the University of Texas Health Science Center at Houston School of Public Health, and an M.S. in biomedical engineering from Duke University. He holds a B.S. in biomedical engineering and a B.A. in chemistry from Boston University. Dr. Sanchez is a fellow of the American Academy of Family Physicians and is certified by the American Board of Family Medicine.

Ellen Wartella, Ph.D., is Al-Thani professor of communication and professor of psychology and human development and social policy at Northwestern University. She directs the Center on Media and Human Development in the School of Communication at Northwestern. Previously, she was distinguished professor of psychology at the University of California, Riverside (UCR), where she also served as executive vice chancellor and provost. Dr. Wartella is a co-principal investigator on a 5-year, multisite research project entitled IRADS Collaborative Research: Influence of Digital Media on Very Young Children, funded by the National Science Foundation. She was a co-principal investigator for the National TV Violence Study and a co-principal investigator for the Children's Digital Media Center project, funded by the National Science Foundation. She serves on the National Educational Advisory Board of the Children's Advertising Review Unit of the Council of Better Business Bureaus, the board of directors for the World Summit on Media for Children Foundation, the PBS KIDS Next Generation Media Advisory Board, the board of trustees for Sesame Workshop, and advisory boards for Harvard's Center on Media and Child Health and The Rudd Center for Food Policy and Obesity at Yale University. Dr. Wartella is a member of the American Psychological Association and the Society for Research in Child Development and is past president of the International Communication Association. Recent honors include election as a fellow of the American Association for the Advancement of Science and the Steven H. Chaffee Career Productivity Award from the International Communication Association. Dr. Wartella has served on the NRC/IOM Board on Children, Youth, and Families and the IOM Committee on Food Marketing and the

Diets of Children and Youth. She served as chair of the IOM Committee on Examination of Front-of-Package Nutrition Rating Systems and Symbols. Dr. Wartella received a B.A. with honors in economics from the University of Pittsburgh and M.A. and Ph.D. degrees in mass communications from the University of Minnesota, and completed her postdoctoral research in developmental psychology at the University of Kansas.

C

Biographical Sketches of Speakers

Jamie F. Chriqui, Ph.D., M.H.S., is senior research scientist and director of policy surveillance and evaluation in the Health Policy Center within the Institute for Health Research and Policy at the University of Illinois at Chicago (UIC) and research associate professor in political science at UIC. She has more than 21 years' experience conducting public health policy research, evaluation, and analysis, with an emphasis on obesity, substance abuse, tobacco control, and other chronic disease-related policy issues. Dr. Chriqui has led a number of efforts to develop quantitative measures of the extensiveness of state- and local-level public health policies. Her research interests focus on examining the impact of law and policy on community and school environments as well as individual behaviors and attitudes. Her current research focuses on sugar-sweetened beverage taxation, school district wellness policies, and community policies related to the physical activity and food environments. She directs all state, local and school district policy research activities for the Robert Wood Johnson Foundation-supported Bridging the Gap program and is principal investigator or co-investigator on several NIH-funded research grants. She serves on numerous obesity-related advisory and expert panels and is widely called upon for her expertise in obesity policy-related issues. Before joining UIC, Dr. Chriqui served as technical vice president of the Center for Health Policy and Legislative Analysis at The MayaTech Corporation and prior to that as a policy analyst at the National Institute on Drug Abuse. She holds a B.A. in political science from Barnard College at Columbia University; an M.H.S. in health policy from the Johns Hopkins University School of

Hygiene and Public Health; and a Ph.D. in policy sciences (health policy concentration) from the University of Maryland, Baltimore County.

Brian Cole, Dr.P.H., is program manager and lead analyst for the Health Impact Assessment Group at the University of California, Los Angeles (UCLA) School of Public Health. Since 2001 he has worked with the project's principal investigator, Jonathan Fielding, leading an interdisciplinary team in the conduct of health impact assessments (HIAs) for a wide range of public policies and projects, providing HIA training, and developing a national clearinghouse for HIA. Besides his work on HIA, Dr. Cole is engaged in a number of research projects promoting physical activity in school, workplace, and community settings. He received his Dr.P.H. degree from the UCLA School of Public Health and undergraduate degrees in environmental science and biology from Washington State University.

Carlos J. Crespo, Dr.P.H., is professor and director of the School of Community Health at Portland State University. His previous work experience includes working for the National Center for Health Statistics, Centers for Disease Control and Prevention, on the planning and development of the National Health and Nutrition Examination Survey. He also worked as a public health analyst for the Office of Prevention, Education and Control of the National Heart, Lung, and Blood Institute at the National Institutes of Health. Dr. Crespo's main areas of research are the epidemiology of physical activity in the prevention of chronic diseases and minority health issues. He has been a contributing author to five textbooks on minority health and sports medicine and more than 10 government publications, including the surgeon general's report on physical activity and health. Dr. Crespo received the 1997 U.S. Secretary of Health Award for Distinguished Service as part of the *Salud para su Corazon* campaign, and in 2003 became a minority health scholar from the National Institutes of Health. He is an emeritus board member of the American Council for Exercise and past president of the Mid-Atlantic Regional Chapter of the American College of Sports Medicine. Currently he is a member of the National Advisory Council of the Robert Wood Johnson Foundation Active Living Research, director of the World Health Organization Collaborating Center in Urban and Health Sustainability, and a fellow of the American College of Sports Medicine. Dr. Crespo graduated from the Inter American University of Puerto Rico, and received an M.S. in sports health from Texas Tech University and a Dr.P.H. in preventive care from the Loma Linda University.

Amy A. Eyler, Ph.D., is associate research professor in the George Warren Brown School of Social Work and Prevention Research Center at Washington University in St. Louis. Dr. Eyler's main research interests are physical

activity, community policy and environmental interventions, and evaluation. She is currently principal investigator for the Physical Activity Policy Research Network (PAPRN), which is funded to study the effectiveness of policies related to increasing physical activity in communities. Studies conducted through the network include a case study on policies influencing active transportation to and from school, a study of policies influencing the development of community trails, a study of state legislation on physical education, and an analysis of bicycle/pedestrian master plans. Dr. Eyler also recently coordinated the Women's Cardiovascular Health Network, a multi-site project conducted to study women of diverse race/ethnicity and physical activity. She is a member of the American Public Health Association and American College of Sports Medicine and is a certified health education specialist. Dr. Eyler received a master's degree in physical education and adult fitness from Ohio University and a doctorate in public health from Oregon State University

Karen Glanz, Ph.D., M.P.H., is George A. Weiss University Professor, professor of epidemiology in the School of Medicine, professor of nursing in the School of Nursing, and director of the Center for Health Behavior Research at the University of Pennsylvania. She was previously at Emory University (2004-2009), the University of Hawaii (1993-2004), and Temple University. Dr. Glanz's research focuses include cancer prevention and control; obesity, nutrition, and the built environment; chronic disease prevention and control; and health communication technologies. She is a member of the Task Force on Community Preventive Services, a federally appointed body that oversees the *Community Guide* evidence reviews. Her scholarly contributions consist of more than 300 journal articles and book chapters. Dr. Glanz is senior editor of *Health Behavior and Health Education: Theory, Research, and Practice* (Jossey-Bass Inc., 1990, 1996, 2002, 2008), a widely used text recently published in its fourth edition. She was designated a highly cited author by ISIHighlyCited.com, in the top 0.5 percent of authors in her field over a 20-year period. She received her M.P.H. and Ph.D. degrees in health behavior and health education from the University of Michigan.

Sonya Grier, Ph.D., M.B.A., is associate professor of marketing in the Kogod School of Business at American University. Dr. Grier conducts interdisciplinary research on topics related to targeted marketing, the social impact of marketing, and race in the marketplace. Her current research is investigating the influence of commercial and social marketing activities on health promotion, disease prevention, and the elimination of health disparities. Focal topics include obesity prevention, digital marketing to children and adolescents, and the relationship of targeted marketing to pub-

lic health. Prior to joining American University, Dr. Grier was a member of the Robert Wood Johnson Foundation Health & Society Scholars program at the University of Pennsylvania. She also spent 2 years as an in-house consultant at the Federal Trade Commission, where she provided consumer research expertise as part of a presidentially mandated team examining the targeted marketing of violent movies, music, and video games to American youth. Dr. Grier has published her research in leading marketing, psychology, public health, and health policy journals. She received her Ph.D. in marketing from Northwestern University, where she also received her M.B.A. and undergraduate degrees.

Christine Hoehner, Ph.D., M.S.P.H., is assistant professor in the Division of Public Health Sciences at Washington University in St. Louis. At Washington University, she is a research member in the Siteman Cancer Center Prevention and Control Program and the Prevention Research Center. Dr. Hoehner's research interests include obesity and chronic disease prevention, as well as the elimination of health disparities across these health outcomes. Over the past 10 years, she has worked on a variety of research projects related to physical activity and the built environment in both the United States and Latin America. She has demonstrated leadership in applying diverse approaches to understand the role of non-health sectors in influencing health. Currently, she is principal or co-investigator on projects funded by the American Cancer Society, the Centers for Disease Control and Prevention, and the National Institutes of Health. Dr. Hoehner received her Ph.D. in public health studies from Saint Louis University and her M.S.P.H. in epidemiology from Emory University.

Robert C. Hornik, Ph.D., is Wilbur Schramm professor of communication and health policy at the Annenberg School for Communication, University of Pennsylvania. Since 2003, he has directed the university's National Cancer Institute (NCI)-funded Center of Excellence in Cancer Communication Research. Previously he led an evaluation of the U.S. National Youth Anti-drug Media Campaign, as well as more than 20 evaluations of public health communication campaigns in the United States and worldwide. Dr. Hornik is the author of *Development Communication*, edited *Public Health Communication: Evidence for Behavior Change*, and co-edited *Prediction and Change of Health Behavior*. He has served on four Institute of Medicine committees. He is currently chair of the faculty senate of the University of Pennsylvania. Dr. Hornik received his Ph.D. in communication research from Stanford University.

Laura Kettel Khan, Ph.D., is senior scientist for policy and partnerships in the Office of the Director in the Division of Nutrition, Physical Activity,

and Obesity at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia. The division is the primary public health agency working to prevent obesity and chronic diseases in the United States. Its programs focus on state health departments, communities, schools, worksites, and medical care systems. Dr. Kettel Khan serves on numerous national advisory committees related to evaluation and evidence for community environmental and policy efforts. She represents the agency in its national partnerships with private foundations that focus on obesity prevention, such as the Convergence Partnership (which includes Kaiser Permanente, the W.K. Kellogg Foundation, the Kresge Foundation, Nemours, the Robert Wood Johnson Foundation, and The California Endowment) and the National Collaborative on Childhood Obesity Research (which includes CDC, the National Institutes of Health, the U.S. Department of Agriculture, and the Robert Wood Johnson Foundation). Dr. Kettel Khan is a primary author of the CDC Community Recommendations for Obesity Prevention and “The Systematic Screening and Assessment Method: Finding Innovations Worth Evaluating” (*New Directions in Evaluation*, Spring 2010, No. 10). She is currently technical advisor and director for an evaluation of New York City group daycare regulations. Dr. Kettel Khan received her Ph.D. from the University of Arizona.

Susan M. Krebs-Smith, Ph.D., is chief of the Risk Factor Monitoring and Methods Branch in the Division of Cancer Control and Population Sciences at the National Cancer Institute. In that capacity, she oversees a program of research on the surveillance of risk factors related to cancer—including diet, physical activity, weight status, tobacco use, sun exposure, genetics, and family history; methodological issues in improving the assessment of those factors; and issues related to guidance and food policy. Her own surveillance research, using data from the National Nutrition Monitoring and Related Research Program, has emphasized trends in intake of foods and nutrients, especially fruits and vegetables; food sources of nutrients; and factors associated with the intake of foods and/or nutrients. Her contributions in the area of dietary assessment methodology have focused on the development of methods for assessing dietary patterns, the usual intake of foods, overall diet quality, and conformance to dietary guidelines. Her efforts in dietary guidance and food policy include evaluation of the U.S. food supply and estimation of future demand for food commodities, based on population-wide adoption of the Dietary Guidelines for Americans and census projections. Dr. Krebs-Smith was a member of the drafting committee for the 2005 Dietary Guidelines. She has been a member of the Advisory Committee for the International Conference on Dietary Assessment Methods. She has served on the editorial boards for both the *Journal of the American Dietetic Association* and the *Journal of Nutrition Education*

and Behavior and on the governing council of the American Public Health Association. Dr. Krebs-Smith received an undergraduate degree in home economics from Bradley University, an M.P.H. from the University of Minnesota, and a Ph.D. in nutrition from The Pennsylvania State University.

Robert M. Malina, Ph.D., FACSM, is professor emeritus in the Department of Kinesiology and Health Education at the University of Texas, Austin, and research professor in the Department of Kinesiology at Tarleton State University, Stephenville, Texas. He taught at the University of Texas, Austin, from 1967 to 1995 and at Michigan State University from 1995 to 2002, when he retired. Combined interests in the physical activity and sport sciences and in biological anthropology in the context of growth and maturation have been a constant in his career. Although his interests are diverse, Dr. Malina's career has focused on (1) the biological growth and maturation of children and adolescents, with an emphasis on motor development and performance, physical activity, and youth sports and young athletes; (2) the potential influence of physical activity and training for sport; and (3) the influence of chronic undernutrition and more recently the emergence of overweight in rural indigenous populations in southern Mexico. Dr. Malina served as editor-in-chief of the *American Journal of Human Biology* (1990-2002), editor of the *Yearbook of Physical Anthropology* (1980-1986), and section editor for growth and development for the *Exercise and Sport Sciences Reviews* (1981-1999) and the *Research Quarterly for Exercise and Sport* (1981-1993). He currently serves on the editorial boards of several journals in the sport sciences and biological anthropology. Dr. Malina earned doctoral degrees in physical education (University of Wisconsin) and anthropology (University of Pennsylvania) and honorary degrees from the Catholic University of Leuven, Belgium; the Bronislaw Czech University School of Physical Education in Kraków, Poland; the University School of Physical Education, Wrocław, Poland; and the University of Coimbra, Portugal.

Robin McKinnon, Ph.D., M.P.A., is health policy specialist in the Risk Factor Monitoring and Methods Branch at the National Cancer Institute. Dr. McKinnon works on activities intended to advance policy-relevant research on diet, physical activity, and weight. Her research interests focus on public policies intended to reduce obesity incidence and prevalence and include the effects of food and physical activity environments on individual diet and physical activity behavior, measurement of the food and physical activity environments, the economic effects of rising obesity rates at the population level, and evaluation of public policies that may affect diet and/or activity behavior. Dr. McKinnon earned her Ph.D. in public policy and administration at The George Washington University in Washington, DC.

She also received an M.P.A. from Harvard University and a B.A. from the Australian National University.

Shu Wen Ng, Ph.D., is assistant professor of nutrition at the University of North Carolina Gillings School of Global Public Health. As a health economist, she is interested in studying the economic, social, and environmental determinants of weight gain. Understanding the U.S. food supply is an area on which she is currently focusing as part of a Robert Wood Johnson Foundation-funded evaluation of the food industry's commitment to cutting calories from the U.S. market. Dr. Ng is working with large commercial databases to pull together detailed data on food sales and purchases and nutrition at the universal product code (UPC) level to estimate calories and macronutrients sold and purchased, how they are changing within and across food groups, and the differential responses to prices among vulnerable populations. Findings from this research will provide information on the nutritional performance of the food industry and have implications for policy making (e.g., regulation of the food industry, food assistance, nutrition education). Dr. Ng received a B.Sc. from Duke University and a Ph.D. in health policy and management from the University of North Carolina at Chapel Hill.

Victoria Rideout, M.A., is president and founder of VJR Consulting, a private consulting firm specializing in media research and social marketing strategy. Until 2010 she served as vice president of the Kaiser Family Foundation and director of the foundation's Program for the Study of Media and Health. Ms. Rideout directed more than 30 studies on topics concerning media and health, including a 10-year study tracking the evolving nature of media use among children and youth, research quantifying the amount and nature of food advertising to children on television and the Internet, surveys on teenagers' use of the Internet for health information, content analyses of public service advertising on television, and several studies documenting the positive influence of health-related content in entertainment television. Her research has been published in peer-reviewed journals such as the *Journal of the American Medical Association*, *Pediatrics*, the *Journal of Public Policy and Marketing*, *Health Affairs*, and *American Behavioral Scientist*, and has been widely reported in the news media. Ms. Rideout has also negotiated partnerships with the television networks MTV, BET, and UPN, securing high-profile, multi-million-dollar donations of media time to conduct youth-oriented public education campaigns. The public service ads, original long-form programming, and online content she helped develop through these partnerships received many awards, including a National Emmy Award for best public service campaign. Ms. Rideout received a B.A.

from Harvard University and an M.A. from the Maxwell School of Public Affairs at Syracuse University.

Maya Rockeymoore, Ph.D., is president and CEO of Global Policy Solutions (GPS), a social change strategy firm based in Washington, DC. GPS offers a range of policy, program, and organizational development services to clients from the nonprofit, philanthropic, and governmental sectors. As a part of her GPS work, Dr. Rockeymoore is program director for Leadership for Healthy Communities, a national program of the Robert Wood Johnson Foundation (RWJF) designed to support elected and appointed officials in efforts to advance policies that support healthy eating and active living. The program contributes to RWJF's goal of reversing the childhood obesity epidemic by 2015. Dr. Rockeymoore has presented and written extensively about health disparities, childhood obesity prevention, health care reform, community-based approaches to health, and Medicaid and Medicare policy. Among her various publications, she co-authored the *Action Strategies for Healthy Communities Toolkit* and has published articles in the *American Journal of Preventive Medicine* and the National Association of State Boards of Education's *State Education Standard* examining community and school efforts to address childhood obesity. Dr. Rockeymoore is also co-editor of *Strengthening Community: Social Insurance in a Diverse America* (Brookings Institution Press, 2004). In addition, she serves on numerous health-related boards and advisory groups, including the National Committee to Preserve Social Security and Medicare, the National Policy and Legal Analysis Network to Prevent Childhood Obesity, Salud America!, the South Carolina Rural Health Research Center Research Users Network Advisory Group, and the RWJF Environmental and Policy Working Group. A member of the National Academy of Social Insurance, Dr. Rockeymoore contributed to the development of its seminal study panel report, *Strengthening Medicare's Role in Reducing Racial and Ethnic Health Disparities*, in 2006. She formerly served as vice president for research and programs at the Congressional Black Caucus Foundation, senior resident scholar for health and income security at the National Urban League's policy institute, chief of staff to Congressman Charles Rangel, professional staff on the U.S. House of Representatives Ways and Means Committee, and assistant to the director of the Marion County Health Department in Indianapolis. Dr. Rockeymoore earned her Ph.D. and M.A. in political science with an emphasis in public policy from Purdue University.

James F. Sallis, Ph.D., is professor of psychology at San Diego State University and director of Active Living Research, a program of the Robert Wood Johnson Foundation. His primary research interests are promoting physical activity and understanding policy and environmental influences

on physical activity, nutrition, and obesity. He has made contributions in the areas of measurement, correlates of physical activity, intervention, and advocacy. His health improvement programs have been studied and used in health care settings, schools, universities, and companies. Dr. Sallis is the author of more than 450 scientific publications, co-author of several books, a member of the editorial boards of several journals, and one of the world's most cited authors in the social sciences. His current focus is using research to inform policy and environmental changes that will increase physical activity and reduce childhood obesity. He is a frequent consultant to universities, health organizations, and corporations worldwide. Dr. Sallis frequently appears in major media outlets, and *Time* magazine identified him as an "obesity warrior." He received his Ph.D. in clinical psychology from Memphis State University.

Sarah Samuels, Dr.P.H., is president of Samuels & Associates, a public health evaluation, research, and policy consulting firm created in 1994. Dr. Samuels has designed philanthropic initiatives and conducted policy-related research and multisite program evaluations. Samuels & Associates has pioneered efforts to measure and assess changes in the food and physical activity environments, particularly in low-income communities. As a program officer at the Kaiser Family Foundation, Dr. Samuels was instrumental in developing major foundation initiatives, including Project LEAN, a national nutrition social marketing campaign. With Samuels & Associates, she has been lead evaluator for the California Endowment's Healthy Eating Active Communities (HEAC) and the Central California Regional Obesity Prevention Program (CCROPP) initiative. She serves as co-principal investigator for several Robert Wood Johnson Foundation Healthy Eating Research awards, including the California School Nutrition Standards Study, the Child Nutrition Commodity Foods Project, the California Child Care Food Assessment, and the Evaluation of a Full Service Grocery Store in a Low Income Community. Dr. Samuels is principal investigator for a National Institutes of Health Small Business Award (SBIR) for the development of FoodBEAMS, an electronic food and beverage monitoring and reporting tool. She works as a consultant to philanthropic organizations including the Rosalinde and Arthur Gilbert Foundation and the S.D. Bechtel, Jr. Foundation. Dr. Samuels is a founding member of the Strategic Alliance to Promote Healthy Food and Physical Activity Environments and serves on the board of California Food Policy Advocates. She served on the Institute of Medicine Planning Committee on Community Perspectives on Obesity Prevention and the Centers for Disease Control and Prevention Committee on Community Measures. She was a Pew health policy fellow at the Institute for Health Policy Studies, University of California, San Francisco, and is a lecturer at the University of California, Berkeley, School of Public

Health. She received the 2005 Catherine Cowell Award from the American Public Health Association. Dr. Samuels holds a doctorate in public health from the University of California, Berkeley, and master's degrees in nutrition and education from Columbia University, Teacher's College.

Roland Sturm, Ph.D., is a senior economist at RAND and professor of policy analysis at the RAND Pardee Graduate School, where he teaches econometrics in the Ph.D. program. Dr. Sturm is the author of 150 scientific publications and has regularly testified on health and health care policy in Congress and state legislatures. His current research analyzes the costs and benefits of economic and regulatory approaches to preventing obesity, increasing physical activity, and improving the diet of Americans. In the past 12 months, several hundred news reports have covered his research publications on soda taxes, the Los Angeles fast-food ban, and the social costs of excess sodium in the U.S. diet. From 1996 to 2003, Dr. Sturm directed the economic and policy research program of the joint RAND/University of California, Los Angeles (UCLA) Research Center on Managed Care, and he was awarded the National Institute of Health Care Management's award for excellence in health services research in 2001. Dr. Sturm received an M.S. in economics from the University of Florida and an M.A. in statistics and a Ph.D. in economics from Stanford University.

D

Acronyms and Abbreviations

ACE-Obesity	Assessing Cost-Effectiveness in Obesity
APIS	Alcohol Policy Information System
BMI	body mass index
CATCH	Coordinated Approach to Child Health
CCROPP	Central California Regional Obesity Prevention Program
CDC	U.S. Centers for Disease Control and Prevention
CLASS	Classification of Laws Associated with School Students
CPPW	Communities Putting Prevention to Work
FASEB	Federation of American Societies for Experimental Biology
FoodBEAMS	Food and Beverage Environmental Analysis and Monitoring System
g	gram
GIS	geographic information system
GRP	gross ratings point
HEAC	Healthy Eating, Active Communities
HHS	U.S. Department of Health and Human Services
HIA	health impact assessment

HIA-CLIC	Health Impact Assessment Clearinghouse Learning and Information Center
IOM	Institute of Medicine
IOTF	International Obesity Task Force
LHC	Leadership for Healthy Communities
MET	metabolic equivalent of the task
NASBE	National Association of State Boards of Education
NCCOR	National Collaborative on Childhood Obesity Research
NEMS	Nutrition Environment Measures Survey
NHANES	National Health and Nutrition Examination Survey
NIAAA	National Institute on Alcohol Abuse and Alcoholism
NIH	National Institutes of Health
PA	physical activity
PANES	Physical Activity Neighborhood Environment Scale
PAPRN	Physical Activity Policy Research Network
PE	physical education
PLU	price lookup code
PSA	public service announcement
RWJF	Robert Wood Johnson Foundation
UPC	universal product code
USDA	U.S. Department of Agriculture
WHO	World Health Organization
WWT	Working Well Trial