

**DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Centers for Disease Control and Prevention  
Nutrition, Physical Activity, and Obesity Prevention Program**

**Resource Guide for Nutrition and Physical Activity Interventions  
to Prevent Obesity and Other Chronic Diseases**

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## Nutrition and Physical Activity Goals

To prevent and control obesity and other chronic diseases, nutrition and physical activity program should include obesity prevention and control (including caloric intake and expenditure), increased physical activity, improved nutrition (including increased breastfeeding and increased consumption of fruits and vegetables), and reduced television time.

Nutrition and physical activity goals of the program are to

- Decrease levels of obesity or reduce the rate of growth of obesity in communities reached through interventions.
- Increase physical activity and better dietary behaviors in communities reached through interventions.
- Increase the number of state or community nutrition and physical activity policies and environmental supports that are planned, initiated or modified for preventing or controlling obesity and other chronic diseases.
- Increase the number of interventions for nutrition and physical activity that are implemented and evaluated.
- Increase the number of communities that implement a nutrition and physical activity plan for preventing and controlling obesity and other chronic diseases.

Community-based nutrition and physical activity program development and implementation includes a collaborative approach with local public and private partners and state government partners to

- describe the obesity epidemic and other chronic diseases in the community;
- describe the nutrition and physical activity risk factors associated with obesity and other chronic diseases;
- describe the population subgroups affected by obesity;
- set priorities with and for the subgroups;
- identify the behaviors of the population subgroups which are priorities for intervention;
- use the social-ecological model to guide planning to address obesity and other chronic diseases in these populations;
- select and implement interventions from proven resources (see Attachments 3–7) so that multiple levels of influence in the social-ecological model (Attachment 8) are addressed. Consider using a social marketing approach in the intervention (Attachment 9).

As used in this document, the term “obesity” encompasses both the terms “overweight” and “obesity” among children and adults. For definitions of overweight and obesity please see <http://www.cdc.gov/nccdphp/dnpa/obesity/bmi.htm> and <http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm>. The term *primary prevention* pertains to preventing obesity through nutrition and physical activity interventions. Efforts at primary prevention will focus both on attempts to influence behaviors and on environmental supports that help people make and sustain health promoting behaviors to improve their diets and physical activity levels. The term *secondary prevention* refers to the treatment and control of obesity through nutrition and physical activity and other medical interventions (Attachment 11).

## Attachment 1

### BACKGROUND

#### Trends in Overweight Among Children and Adolescents

The most recent estimates of prevalence of overweight for children (see footnote 1) in the United States are 10% among children aged 2 to 5 years, 15% among children aged 6 to 11 years, and almost 16% among children aged 12 to 19 years (Table 1).<sup>1</sup> These estimates were generated using weight and stature measurements collected in the 1999–2000 National Health and Nutrition Examination Survey (NHANES). The current prevalence estimates reflect additive increases of 3%, 4%, and 5% among children 2 to 5, 6 to 11, and 12 to 19 years of age, respectively, compared with data obtained during the 1988–1994 NHANES III Survey.<sup>1</sup> In the 1960’s, the prevalence of overweight among children aged 6 to 11 years was 4.2% [obtained from the National Health and Examination Survey (NHES) cycle II conducted in 1963–1965], and 4.6% among children aged 12 to 19 years (obtained from the NHES cycle III conducted in 1966–1970).<sup>1</sup> Thus, current estimates reflect additive increases of approximately 11% during the past three to four decades among children within these age groups.

Table 1: Trends in Overweight for Children by Age; Values are percentages (SE); Adapted from Ogden, et al.<sup>1</sup>

AGE	NHES 2 (1963–1965)	NHES 3 (1966–1970)	NHANES I (1971–1974)	NHANES II (1976–1980)	NHANES III (1988–1994)	NHANES 1999–2000
6-23 mo				7.2 (1.0)	8.9 (0.7)	11.6 (1.9)
2-5 y			5.0 (0.6)	5.0 (0.6)	7.2 (0.7)	10.4 (1.7)
6-11 y	4.2 (0.4)		4.0 (0.5)	6.5 (0.6)	11.3 (1.0)	15.3 (1.7)
12-19 y		4.6 (0.3)	6.1 (0.6)	5.0 (0.5)	10.5 (0.9)	15.5 (1.2)

Overweight prevalence estimates differ between racial/ethnic subgroups. The overweight prevalence estimates for non-Hispanic blacks (24%) and for Mexican Americans (23%) are approximately twice that reported for non-Hispanic white (13%) children aged 12 to 19 years (Table 2).<sup>1</sup> These current prevalence estimates for non-Hispanic black and Mexican American adolescents reflect an additive increase of approximately 10% between NHANES III to 1999–2000 NHANES. A significant difference between Mexican American and non-Hispanic white There are no significant differences between racial/ethnic subgroups of children at ages 2 to 5 years.<sup>1</sup>

Table 2: Prevalence of Overweight in Children by Age and Race/Ethnicity; NHANES 1999-2000; Values are percentages (SE); Adapted from Ogden, et al.<sup>1</sup>

Age	Non-Hispanic White	Non-Hispanic Black	Mexican American
2–5 y	10.1 (2.4)	8.4 (2.3)	11.1 (2.5)
6–11 y	11.8 (2.4)	19.5 (2.0)	23.7 (2.0)*
12–19 y	12.7 (1.7)	23.6 (2.1)*	23.4 (2.1)*

\* Significantly different from non-Hispanic whites ( $p < 0.05$ ).

(Footnote 1) Overweight in children is defined as body mass index [weight (kg)/stature (m)<sup>2</sup>]  $\geq$  the 95<sup>th</sup> percentile for age and sex.

Similar estimates for the prevalence of overweight were reported in a longitudinal investigation (National Longitudinal Survey of Youth) that is nationally representative of young children born to mothers who were 23 to 39 years of age.<sup>2</sup> In 1998, overweight prevalence estimates for children 4 to 12 years of age were 22% among African Americans, 22% among Hispanics, and 12% among non-Hispanic whites. Between 1986 and 1998, the additive increase in the prevalence of overweight was approximately 17% among African Americans and Hispanics compared to approximately 5% among whites. Generally, yearly rates of increase in overweight were greater among boys, African Americans, and those living in southern states.<sup>2</sup>

## References

1. Ogden CL, Flegal KM, Carroll MD, and Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999–2000. *JAMA*. 2002;288:1728–1732.
2. Strauss RS and Pollack HA. Epidemic increase in childhood overweight, 1986–1998. *JAMA*. 2001;286:2845–2848.

**Attachment 1  
(Continued)**

**Dietz, William H. Statement before Committee on Health, Education, Labor,  
and Pensions Subcommittee on Public Health, U.S. Senate, May 21, 2002**

(Note: Some of the figures used in this statement have been updated by more recent data since the presentation in May 2002. The new figures are not included in this original statement.)

**Burden of Obesity**

The burden placed on our society by obesity and related chronic diseases is enormous. In the last 10 years, obesity rates have increased by more than 60 percent in adults. Since 1980, rates have doubled in children and tripled in adolescents. Twenty five percent of the adult population in the United States is obese, or approximately 45 million adults. Almost 15% of our children and adolescents are overweight, or approximately 8 million youth. Rates of obesity have increased more rapidly among African Americans and Mexican Americans than among Caucasians. Obesity in the United States is truly epidemic.

We have already begun to see the impact of the obesity epidemic on other diseases. For example, type 2 diabetes, a major consequence of obesity, has also increased rapidly over the last 10 years. Although type 2 diabetes was virtually unknown in children and adolescents 10 years ago, it now accounts for almost 50% of new cases of diabetes in some communities. Obesity is also a major contributor to heart disease, arthritis, and some types of cancer. Recent estimates suggest that obesity accounts for 300,000 deaths annually, second only to tobacco related deaths.

The contribution of childhood onset obesity to adult disease is even more worrisome. Although onset of obesity in childhood only accounts for 25% of adult obesity, obese adults who were overweight children have much more severe obesity than adults who became obese in adulthood. Sixty percent of overweight children have at least one additional cardiovascular disease risk factor, and 25 percent have two or more. Hospitalization rates for the complications of obesity in children and adolescents have tripled.

The combination of chronic disease death and disability accounts for roughly seventy-five percent of the \$1.3 trillion spent on health care each year in the United States. Last year, the Surgeon General's Call to Action on Obesity suggested that obesity and its complications were already costing the nation \$117 billion annually. By way of comparison, obesity has roughly the same association with chronic health conditions as does 20 years of aging, and the costs of obesity were recently estimated to exceed the health care costs of smoking and problem drinking. The rapid increases in obesity across the population and the burden of costly diseases that accompany obesity indicate that we can no longer afford to ignore it.

The rapidity with which obesity has increased can only be explained by changes in the environment that have modified calorie intake and energy expenditure. Expenditure on foods prepared outside of the home now accounts for over 40% of a family's budget spent on food. Soft drink consumption supplies the average teenager with over 10% of their daily caloric intake. The variety of foods available have multiplied, and portion size has increased dramatically. Fewer children walk to school, and the lack of central shopping areas in our communities means that we make fewer trips on foot than we did 20 years ago. Hectic work and family schedules allow little time for physical activity. Schools struggling to improve academic achievement are dropping physical education and assigning more homework, which leaves less time for sports and physical activity. Television viewing has increased. Neighborhoods are unsafe for walking, and parks are unsafe for playing. Office buildings have inaccessible and uninviting stairwells that are seldom used, and communities are built without sidewalks or bike trails to support physical activity.

### **Public Health Approach**

Given the size of the population that we are trying to reach, we obviously cannot rely solely upon individual interventions that target one person at a time. Instead, the prevention of obesity will require coordinated policy and environmental changes that affect large populations simultaneously.

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Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults. *Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults*. Bethesda, MD: National Institutes of Health (US); 1998. Available at [http://www.nhlbi.nih.gov/guidelines/obesity/ob\\_home.htm](http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm) (accessed April 11, 2003).

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obesity epidemic in the United States, 1991–1998. *JAMA* 1999;282(16):1519–22.

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Wolf AM, Colditz GA. Current estimates of the economic cost of obesity in the United States. *Obesity Research* 1998;6(2):97–106.

## Attachment 2

### Community Nutrition and Physical Activity Planning Resources

Below are selected reference documents and websites related to developing or updating community nutrition and physical activity plans.

Nutrition and Physical Activity Workgroup. *Guidelines for Comprehensive Programs to Promote Healthy Eating and Physical Activity*. 2002. Available at <http://www.astphnd.org/>\* (accessed April 11, 2003).

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. *Promising Practices in Chronic Disease Prevention: A Public Health Framework For Action*, 2003. Available at [http://www.cdc.gov/nccdphp/promising\\_practices/index.htm](http://www.cdc.gov/nccdphp/promising_practices/index.htm) (accessed April 11, 2003).

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University of California, Agriculture and Natural Resources. *Children and Weight: What Communities Can Do*. Publication 3422. Available at <http://www.cnr.berkeley.edu/cwh/resources/childrenandweight.shtml>\* (accessed April 11, 2003).

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. *Promoting Physical Activity: A Guide for Community Action*. Champaign, IL: Human Kinetics, 1999. Available at <http://www.cdc.gov/nccdphp/dnpa/pahand.htm> (accessed April 11, 2003).

U. S. Department of Health and Human Services. *Promoting Better Health for Young People Through Physical Activity and Sports, A Report to the President From the Secretary of Health and Human Services and the Secretary of Education*, 2000. Available at [http://www.cdc.gov/nccdphp/dash/healthtopics/physical\\_activity/promoting\\_health/](http://www.cdc.gov/nccdphp/dash/healthtopics/physical_activity/promoting_health/) (accessed April 11, 2003).

U. S. Department of Health and Human Services. *HHS Blueprint for Action on Breastfeeding*. Washington, DC:USDHHS, Office of Women's Health, 2000. Available at <http://www.cdc.gov/breastfeeding/report-blueprint.htm> (accessed April 11, 2003).



**CDC Web Site Resources** (files accessed April 11, 2003):

Physical Activity: <http://www.cdc.gov/nccdphp/dnpa/physical/index.htm>

Breastfeeding Promotion and Support: <http://www.cdc.gov/breastfeeding/>

5 A Day Fruits and Vegetables: <http://www.cdc.gov/nccdphp/dnpa/5ADay/index.htm>

Growth Charts: <http://www.cdc.gov/growthcharts/>

\* Links to non-Federal organizations are provided solely as a service to our users. Links do not constitute an endorsement of any organization by CDC or the Federal Government, and none should be inferred. The CDC is not responsible for the content of the individual organization Web pages found at this link.

## Attachment 3

### Dietary Determinants of Energy Imbalance

Weight gain occurs when energy intake (caloric intake) exceeds energy expenditure. The 1996 publication *Physical Activity and Health, A Report of the Surgeon General* (<http://www.cdc.gov/nccdphp/sgr/sgr.htm>) provides a summary of energy expenditure determinants related to obesity. This document is comprised of a brief review of the literature related to the dietary determinants of obesity, not recommendations for specific interventions. It is difficult to provide recommendations for obesity prevention and control from the available evidence. As interventions are evaluated rigorously, CDC will provide updates to identify and disseminate effective dietary strategies.

The Determinants of Energy Imbalance workgroup of the Obesity Prevention Network, SIP 7-00, authored this document. Major contributors to this written document are as follows: from the University of California, Berkeley: Gail Woodward-Lopez, Dana Gerstein, and Lorrene Ritchie; Oklahoma University: Allen Knehans; and from the University of New Mexico: Shirley Pareo, Leslie Cunningham-Sabo, and Sally Davis.

#### Dietary Fat

While Americans have decreased the percent of total energy from dietary fat, on average, they have continued to exceed the recommended  $\leq 30\%$  of total energy from fat (Norris 1997, Troiano 2000). A comparison of the 1989 and 1995 Continuing Survey of Food Intakes by Individuals (CSFII) revealed a steady decline in the percent of energy from total fat and saturated fat over the last 30 years, however the amount of fat in the diets (mean total fat in grams) increased from 1989 to 1995 (Males age 19–50 consumed a mean of 93.7 grams of total fat in 1989–1991 and 100.9 grams in 1995; Females age 19–50 consumed a mean of 63.2 grams of total fat in 1989–1991 and 65.5 grams in 1995) (Kennedy 1999). There is reason to believe that a diet containing even less than the recommended 30% of total energy from fat could be beneficial for energy balance, long-term weight maintenance and a reduction of diet-related chronic disease risk (Astrup 2001, Hill 2000). There is abundant cross-sectional evidence that supports the premise that dietary fat is positively associated with obesity. The primary reason for this is that higher intakes of dietary fat are associated with higher energy intakes. There are several ways in which dietary fat leads to excess energy intake: its low satiety value as compared to other macronutrients (Stubbs 2000; Astrup 2001, Bray 1998, Golay 1997, Stubbs 2001), and its high palatability, high energy density, efficient storage, and lower oxidative rates (Schrauwen 2000, Hill 2000). It should be noted that not all dietary fats have the same oxidation rate; some fatty acids, such as medium-chain triglycerides, have been shown to have higher oxidation rates and these are metabolized differently. In general, unsaturated fatty acids are oxidized more rapidly than saturated fats, which lead to greater energy expenditure (St-Onge 2002, Delany 2000).

In controlled settings, dietary fat independent of caloric intake does not lead to obesity. In other

words, if the caloric amount stays the same, a higher percent of calories from fat will not lead to obesity. However, in a free-living situation with individuals eating ad libitum, it appears that higher fat diets are much more likely to lead to excess caloric intake than lower fat diets (Schrauwen 2000). There is ample evidence that if the percentage of fat in the diet is lowered enough, most individuals could eat ad libitum and not gain weight (Rolls 2000). In other words high fat diets tend to trump the satiety mechanisms which facilitate energy balance (Astrup 2001).

Of course there are exceptions to this rule. Other diets, such as high protein, low carbohydrate diets may be high in fat. The ketosis, which is induced by this type of diet suppresses the appetite and results in low calorie intakes (St. Jeor 2001). But the percent fat in these diets is not the reason these diets can be effective — it is the high protein and low carbohydrates that are inducing the effect. While the comparative safety and efficiency of weight loss diets are beyond the scope of this review, it is important to establish that this phenomenon does not refute the hypothesis that low fat diets facilitate energy balance, but rather demonstrates there are other types of diets that can have a similar effect, at least temporarily. Low fat diets, however, have been shown repeatedly to be more effective for the prevention of overweight and for long-term weight maintenance (Rolls 2000).

Astrup A. The role of dietary fat in the prevention and treatment of obesity. Efficacy and safety of low-fat diets. *International Journal of Obesity* 2001; 25 (suppl):S46–S50.

Bray GA, Popkin BM. Dietary fat intake does affect obesity. *American Journal of Clinical Nutrition* 1998;68:1157–73.

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Golay A, Bobbioni E. The role of dietary fat in obesity. *International Journal of Obesity* 1997; 21:S2–S11.

Hill J, Melanson EL, et al. Dietary fat intake and regulation of energy balance implications for obesity. *Journal of Nutrition* 2000;130:284S–88S.

Kennedy ET, Bowman SA, et al. Dietary-fat intake in the US population. *Journal of the American College of Nutrition* 1999;18:207–212.

Norris J, Harnack L, et al. US trends in nutrient intake: the 1987 and 1992 National Health Interview Surveys. *American Journal of Public Health* 1997;87:740–746.

Rolls BJ, Bell EA. Dietary approaches to the treatment of obesity. *Medical Clinics of North America* 2000;84:401–18.

Schrauwen P & Westerterp KR. The role of high-fat diets and physical activity in the regulation of body weight. *British Journal of Nutrition* 2000;84:417–27.

Stubbs J, Ferres S, et al. Energy density of foods: effects on energy intake. *Critical Reviews in Food Science and Nutrition* 2000;40:481–515.

Stubbs RJ, Mazlan N, et al. Carbohydrates, appetite and feeding behavior in humans. *J Nutr* 2001;131:2775S–2781S.

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## **Dietary Fiber**

Few Americans consume the recommended 25 grams of dietary fiber per day. In fact, on average, most Americans consume far less than this recommendation, and the mean daily intake of dietary fiber in the United States is estimated to be 15 grams per day (Howarth 2001). Cross-sectional and ecological studies conducted in developed nations have shown that high fiber intake, or fiber intake at least at the recommended level, is associated with less obesity. Soluble dietary fiber aids in preventing overeating and subsequent weight gain and obesity. The physiological explanation for associating dietary fiber with less total caloric consumption can be explained by its low energy density, increased satiety level, bulkiness (which limits spontaneous intake of energy), and its potential to inhibit macronutrient absorption (Howarth 2001).

In almost all studies examining weight loss, individuals who consume a combination of water soluble and water insoluble fiber sources reported greater rates of weight loss as compared to those who follow low-fiber diets regardless of whether energy intake was fixed or ad libitum (Howarth 2001). The changes in body weight when high-fiber diets are consumed are relatively modest for all studies reviewed but are similar in magnitude to those in studies that compare high-fat and low-fat diets consumed ad libitum (Howarth 2001). A diet that provides adequate dietary fiber, at least the recommended 25 grams per day, is ideal for preventing obesity as well as other diet-related diseases and for maintaining body weight (Stubbs 2001).

Howarth NC, Saltzman E, et al. Dietary fiber and weight regulation. *Nutrition Reviews* 2001;59:129–39.

Stubbs RJ, Mazlan N, et al. Carbohydrates, appetite and feeding behavior in humans. *Journal of Nutrition* 2001;131:2775S–81S.

## Macronutrients and Satiety

Macronutrients have a hierarchical level of satiety — protein providing the greatest amount of satiety followed by carbohydrates and fat (Stubbs 2000). Dietary fat provides significantly less satiety than protein. This hierarchy of satiety helps explain why consuming a diet with more than 30 percentage of its energy from fat can lead to the over-consumption of total energy — dietary fat produces a modest effect of feeling full after its consumption. But, unfortunately, this hierarchy does not seem to be common knowledge among nutrition professionals. This does provide additional evidence to promote the consumption of a low-fat diet for weight maintenance and obesity prevention.

Stubbs J, Ferres S, et al. Energy density of foods: effects on energy intake. *Critical Reviews in Food Science and Nutrition* 2000;40:481–515.

## Energy Density

Energy density is defined as the total metabolized energy from the macronutrients, protein, carbohydrates, fat and alcohol, divided by the total weight of food including water. Nutrition researchers have shown that low energy dense foods play a role in weight loss and energy balance maintenance by providing adequate, or greater, amounts of food while providing less energy (Rolls 2000). Many of these low energy dense foods have also been shown to have higher satiety power indicating that they promote the feeling of fullness or the desire to cease energy intake following the food's consumption (Bell 1998). Water, dietary fat and dietary fiber have all been shown to be predictors of energy density; however, water has been shown to have the greatest influence on energy density because it contributes to the food's weight without the addition of calories (Rolls 1999).

The current US food supply is flooded with highly energy-dense foods. Of these high energy-dense foods, many of them are the newly engineered low-fat foods created in response to the government's message that Americans need to reduce their consumption of fat. While these low-fat food products are in fact lower in fat, they are not necessarily any lower in energy density than their full fat counterparts. Thus, this contributes to Americans' confusion in decisions about healthy food options.

Bell EA, Castellanos VH, et al. Energy density of foods affects energy intake in normal weight women. *American Journal of Clinical Nutrition* 1998;67:412–420.

Rolls BJ, Bell EA. Dietary approaches to the treatment of obesity. *Medical Clinics of North America* 2000;84:401–18.

Rolls BJ, Bell EA, et al. Water incorporated into a food but not served with a food decreases energy intake in lean women. *American Journal of Clinical Nutrition* 1999;70:448–55.

## Sweetened Beverages

There is a large amount of literature documenting the secular increase in the consumption of sweetened beverages, a trend that parallels the national increase in adiposity; however, very few studies to date have examined the relationship between soda/sweetened beverages and adiposity. Annual soft drink production in the US has increased from approximately 100 cans (12 oz) per person in the 1940s and 1950s to nearly 600 cans per person in the 1990s (Jacobson, 2001). During the same time period, per capita soft drink consumption increased from approximately 10 gallons to 200 gallons (Gerrior, 1998). Consumption of sugar-sweetened beverages (soft drinks and fruit drinks) has become particularly high among children and adolescents (Smiciklas-Wright, 2002). Sugar-sweetened beverages are now the principal source of added sugars in the diet of Americans (Morton, 1998; Guthrie, 2000). In terms of mechanism, while there is no clear evidence that sugar per se contributes to weight gain, there is an increasing body of evidence suggesting that liquid sugar may be less well regulated than energy consumed in solid form. This conclusion is based on a review of 40 published studies in humans (Mattes, 1996). Soft drink consumption has been associated with increased energy intake (Harnack, 1999; Chanmugam, 2000). In terms of weight association, Ludwig et al (2001) found that for each additional serving of a sweetened beverage that is consumed daily for a period of one and one half years, the risk of children being overweight increased by 60 percent after controlling for other potentially confounding variables. There are also a few studies among adults that found an association between high consumption of sugar-sweetened beverages and overweight status (Wirfalt, 1997; Keast, 2001).

Chanmugam P, Morton JF, Guthrie JF. Reported changes in energy and fat intakes in adults and their food group sources [abstract]. *FASEB J* 1998;12:A844.

Gerrior S, Putnam J, Bente L. Milk and milk products: their importance in the American diet. *Food Review* 1998;May-August:29–37.

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Mattes RD. Dietary compensation by humans for supplemental energy provided as ethanol or carbohydrate in fluids. *Physiol Behav* 1996;59:179–87.

Morton JF, Guthrie JF. Changes in children's total fat intakes and their food group sources of fat, 1989-91 versus 1994-95: implications for diet quality. *Family Econ Nutr Rev* 1998;11:44-57.

Smiciklas-Wright H, Mitchell DC, Mickle SJ, Cook AJ, Goldman JD. Foods Commonly Eaten in the United States: Quantities Consumed Per Eating Occasion and in a Day, 1994-1996. U.S. Department of Agriculture NFS Report No. 967-5, pre-publication version. 2002.

Wirfalt AKE, Jeffery RW. Using cluster analysis to examine dietary patterns: Nutrient intakes, gender, and weight status differ across food pattern clusters. *J Am Diet Assoc* 1997;97:272-9.

### **Fast food and restaurant use**

There has been a dramatic increase in the consumption of food prepared away from home in the United States. In 1992, 38 percent of the food dollar was spent on foods eaten away from home, an increase from about 20 percent in the 1970s (Schwenk, 1995). Likewise, the percentage of meals and snacks eaten away from home increased from 16 percent in 1977-78 to 27 percent in 1995 (Harnack, 2000). Frequent consumption of foods away from home has been associated with a diet high in fat and calories, and therefore energy density (Jeffery, 1998; Clemens, 1999; Zoumas-Morse, 2001). Since portion sizes served at restaurants have increased (see discussion of portion sizes below) and people are encouraged to purchase meals that contain more calories through "value" marketing, more calories are more likely to be consumed when eating at fast food and other restaurants than when eating at home. Increased palatability and variety of restaurant food might also increase food intake (McCrorry, 1998, 2000). Further, most (Jeffery, 1998; McCrorry, 1999; Binkley, 2000), but not all (Jeffery, 1998 reported an association for women only; Clemens, 1999 found no association in a study of only women) studies have found a positive association between consumption of food away from home and adiposity. However, there is a lack of prospective studies to evaluate the validity of this association and to help establish causality.

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## **Dietary patterns**

While countless studies have examined the relationship between intake of individual nutrients or foods and the risk of obesity, relatively few studies have systematically evaluated the relationship of overall dietary patterns to this risk. An examination of overall dietary patterns is conceptually appealing in that it mimics the way in which people eat, consuming meals and snacks consisting of a variety of foods, rather than of isolated nutrients (Hu, 2000) and may help to elucidate the illusive relationship between kilocalories, nutrients and weight outcomes. The dietary patterns approach has successfully been applied to the study of cancer (Randall, 1992; Slattery, 1998) and coronary heart disease (Nicklas, 1989; Huifbregts, 1995; Hu, 2000), and has shown that a “Western” type diet (characterized by a relatively high intake of red meat, high-fat dairy and refined grains and a relatively low intake of fruits, vegetables, and whole grains) was associated with health risk. Recently, factor or cluster analysis of food groups consumed to identify predominant dietary patterns has been applied to the study of obesity (Tucker, 1992; Wirfalt, 1997; Slattery, 1998; Maskarinic, 2000; Fung, 2001; Haveman-Nies, 2001; Millen, 2001; Pryer, 2001; Tseng, 2001; Sichieri, 2002). Although distinct dietary patterns have been variously defined and identified by different researchers and based on very different food groupings, with results that have not been completely consistent, in general the findings suggest that a “Western” type diet is associated with overweight. In most cases, significant differences in BMI were found on the basis of the dietary pattern, even after controlling for total energy intake. Outside of the U.S., the transition from more traditional dietary patterns to a “Western” dietary pattern has also been associated with increased overweight, a trend that was observed without a concurrent increase in fat intake (Sichieri, 2002). Unfortunately, most dietary pattern studies have been cross-sectional in design. In the only study to examine dietary patterns longitudinally (at baseline and then again at two, 4-year intervals), the prospective relationship between dietary pattern and body fatness was not assessed (Fung, 2001). It is possible that the failure of some studies to detect differences in BMI according to diet pattern, as well as the differences between studies can be attributed to changes in diet adopted by overweight individuals who are attempting to lose weight. In the study by Tseng (2001), for example, no significant difference in BMI was detected between individuals with a “Western” dietary pattern (high meat and starch



intake) and a “prudent” dietary pattern (high in vegetable and fruit intake). However, more individuals reported that they attempted weight loss by following the “prudent” pattern rather than the “Western” pattern. Further, none of the studies examined the dietary patterns of children or adolescents; the focus of most studies were older Caucasian adults.

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### **Portion size**

The increase in portion sizes for restaurant and processed foods and beverages has occurred concurrently with increases in the prevalence of obesity. The average fast food burger which weighed approximately 1 oz in 1957 weighs up to 6 oz now; the typical serving of soda which was 8 fl oz in 1957 is now 32 to 64 fl oz; and the average theatre serving of popcorn which was 3 cups in 1957 is now 16 cups (Nicklas 2001). According to a survey by the National Restaurant Association, which collected menus from the same 66 restaurants in 1988 and again in 1993, the number of menus offering more than one portion size, such as “super” sizes, increased by 12 percent (NRA, 1993). Young and Nestle (2002) recently completed an extensive study of portion sizes from datasets produced by manufacturers. Portion sizes began to rise in the 1970’s, increased in the 1980’s, and have continued to grow steadily in size. In terms of mechanism, larger portion sizes could be viewed as equivalent to increased calorie consumption and, unless compensated for by increased energy expenditure, would result in weight gain. Unfortunately, few studies have empirically evaluated the effect of portion size on overall energy intake and those that have been performed have been cross-sectional and short term with conflicting results (Stunkard 1980; Booth 1981; Edelman 1986; Engell 1995; Rolls 2000). Larger portion sizes are positively associated with increases in calories of the specific food item consumed and it is very likely that increasing portion sizes is contributing to excess energy intake (Hill 1998; Goran 2001). Currently, there is little empirical evidence because of limited studies in this area.

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### **Importance of family/parental involvement in interventions to reduce obesity**

Most of the parenting research has focused on determinants of eating behaviors or eating disorders; direct connections with obesity have been few. It has been shown that mothers who were more controlling of their 3- to 5-year-old's food intake had children who showed higher rates of eating, less ability to self-regulate energy intake, and increased adiposity (Johnson, 1994; Drucker, 1999; Fisher, 1999a). Higher levels of maternal restriction predicted higher levels of snacking in girls 3–5 years of age (Fisher, 1999a, 2000) and restricting access to palatable foods has been shown to increase children's attention on and desire for that food (Fisher, 1999b). On the other hand, excessively permissive child-feeding practices may also have deleterious consequences. Children allowed to snack ad libitum had higher caloric intakes than children provided nutritious snacks at designated times (Birch, 1995). Common parenting strategies may induce effects opposite to those intended. Foods (usually less nutritious foods high in fat and/or sugar) used as a reward, tend to increase child preference for that food. In contrast, having children eat a food (usually a more nutritious food) in order to obtain a reward tends to decrease child preference for that food (Birch, 1999).

For intervention research and programs, family and parental involvement is critical and insures a more effective program (Barlow, 1998). Family involvement has been shown to increase student knowledge and positive attitudes toward healthy habits in a dose response manner (Nader, 1996). Numerous school interventions add a parent component; however, programs frequently report low success of getting parents meaningfully involved (Perry, 1998; Story, 2000). Take-home materials alone may not be powerful enough to produce long-term changes (Perry, 1988). Further it has also been recommended that overweight prevention programs include more information to improve general parenting skills (Jain, 2001).

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## **Calcium and Dairy**

Calcium and dairy are grouped together since most of the calcium in the diets of Americans comes from dairy products. In terms of secular trends, there has been a drop in milk and dairy consumption, with the exception of cheese (Putnam, 1999). Although food disappearance data suggest that per capita calcium intake has increased (from an estimated 890 mg/day per person in 1970 to 960 mg in 1994) (Putnam, 1999), among children and adolescents dietary calcium has

declined in recent decades (USDA, 1996; Albertson, 1997). Mechanistically, it has been hypothesized that dietary calcium could reduce the size of adipose storage and thus the risk of obesity by suppressing the production of 1,25-(OH)<sub>2</sub>vitamin D, a hormone that is thought to be involved in the regulation of lipogenesis and lipolysis (Shi, 2001).

In terms of the association with weight status, lower consumption of calcium and dairy products has been associated with overweight. This has been shown in ecological studies (Zemel, 2000); several prospective studies, one of adult women (Lin, 2000) and one of preschool children (Carruth, 2001); as well as in several intervention studies (Davies, 2000; Zemel, 2000, 2002). The question arises whether the calcium or whether a combination of nutrients found in milk or dairy products is related to this observed effect. There is at least one study that has shown that weight loss is greater when subjects consumed the calcium in the form of dairy products as compared to when calcium is ingested in the form of a supplement (Zemel, 2002).

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## **Attachment 4**

### **Physical Activity Strategies for Reducing Overweight and Related Chronic Diseases**

#### **Rationale**

Millions of Americans suffer from chronic diseases that can be prevented or improved through regular physical activity. For example, regular physical activity substantially reduces the risk of cardiovascular disease, colon cancer, diabetes, obesity, and high blood pressure. Regular physical activity also helps treat a variety of common illness, including arthritis, blood lipid disorders, diabetes, obesity, and cardiovascular disease. Yet, more than 60% of Americans do not get the recommended amounts of physical activity.

#### **Physical Activity Promotion Strategies**

Programs are encouraged to use strategies that address environmental and policy approaches to promoting and supporting physical activity, rather than strategies only directly promoting individual behavior change. Multiple levels of influence should be addressed. For example, improving facilities or increasing access to physical activity opportunities at preschool (e.g., restructuring playgrounds, creating and instituting policies related to the provision of equipment, etc.) are strategies that affect high levels of influence in a comprehensive approach. When strategies to directly promote individual behavior change are used, they should be delivered in conjunction with, or as an adjunct to, environmental and policy strategies. Similarly, when strategies designed to achieve short-term outcomes are used, they should be delivered in conjunction with more long-term strategies related to environmental and policy supports, or with a plan for sustaining or expanding the strategy beyond the period of current funding. An example is implementing walk-to-school programs, with a short-term objective of increasing the number of children walking/biking to school by promoting supervised walking and biking (individual behavior change), and a long-term objective of sustaining and facilitating the choice to walk to school by improving permanent physical environment infrastructure and/or by policy changes (e.g., addition or improvement of sidewalks, lighting, crosswalks, provision of crossing guards, regulation of traffic speed, etc).

The selection of intervention strategies should be based on the best evidence available, and the level of rigor and scope of the evaluation of strategies should be based upon the strength of the evidence base. As an example, programs may translate or disseminate strategies, which are “recommended” or “strongly recommended” by the Task Force on Community Preventive Services (see reference).

Programs may also seek to contribute to the evidence base for environmental and policy intervention strategies, by testing promising strategies for which evidence is currently insufficient as to the effectiveness of the strategy for increasing physical activity. In this case (1) Programs are strongly encouraged to test strategies for which there is some (albeit insufficient) existing data as to effectiveness; and (2) the evaluation approach should be enhanced by data

collection designed to determine the effectiveness of the intervention to increase physical activity. Information about the evidence for strategies has been compiled in some recent reviews. For example, *Promoting Active Transport* (see reference) briefly reviews evidence for several strategies to increase non-motorized transit. Also, the Task Force on Community Preventive Services reviews of transportation policy and urban planning approaches are currently pending, but may be published and accessible shortly. Any type of environmental or policy approach may be considered for implementation in an innovative intervention, including the types identified by the Task Force:

- Creating or enhancing access to places for physical activity combined with information outreach activities.
- Transportation Policy and infrastructure changes to promote non-motorized transit
- Urban planning approaches.

Evaluation of intervention strategies should be guided by the CDC *Framework for Program Evaluation in Public Health* (see reference). This framework has been elaborated specifically for physical activity in the *Physical Activity Evaluation Handbook* (see reference).

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## **Attachment 5**

### **5 A Day — Strategy for Reducing Chronic Diseases**

#### **Rationale**

##### **The Relationship of Vegetable and Fruit Consumption with Cancer and Chronic Disease**

The dietary guidelines that recommend that Americans consume 5 to 9 servings of vegetables and fruits daily are based on substantial scientific evidence. Vegetables and fruits are critical sources of nutrients and other substances that are important to good health. Many studies have examined the relationship of vegetable and fruit consumption with the risk of cancer and other chronic diseases. Increased consumption of vegetables and fruits has been clearly associated with decreased risk of cancer (Block et al., 1992; WCRF, 1997), but there is still a lot to be learned about the way vegetables and fruits offer this protection. Diets rich in vegetables and fruit have also been associated with reduced risk of cardiovascular disease and high blood pressure (Bazzano 2002, Law and Morris 1998, Appel 1997). Vegetable and fruit consumption should be incorporated into an overall healthy lifestyle that includes a diet adequate in dietary fiber, low in saturated fat and cholesterol and increased physical activity (NCI, 1986). These recommendations are reflected in the dietary guidelines from the US Departments of Health and Human Services and Agriculture (USDA, USDHHS 2000).

##### **The Relationship of Vegetable and Fruit Consumption with Weight Management**

Fruits and vegetables could help to reduce energy intake, promote satisfaction, and aid weight management because of their high water and fiber content, low fat content, and low energy density. Energy density refers to the calorie content of one gram of a specific food. Water and fiber reduce the energy density of foods, whereas fat increases it. Water has the biggest impact on energy density, because it adds weight (volume/bulk) without calories. When researchers experimentally reduced the energy density of diets by adding fruits and vegetables they observed a spontaneous reduction in energy intake (Bell and Rolls, 2001). Thus, fruits and vegetables combine a number of components that have been shown to affect satiety and energy intake and therefore have potential as a weight loss strategy.

There are a few important caveats to note about the association between fruit and vegetable consumption and weight regulation. The form in which fruits and vegetables are consumed is very important. Whole fruits and vegetables satisfy and fill people up more than purees or juices (Bolton, Heaton, and Burroughs, 1981). Significant quantities of fruits and vegetables need to be added to foods for them to affect satisfaction and therefore lower energy intake (i.e., the small quantities of fruits and vegetables that are often added to prepackaged foods are unlikely to have an impact). Finally, low energy dense fruits and vegetables need to be substituted for high energy dense foods not simply added on to a person's diet (i.e., snacks such as chips and cookies should be replaced with a whole apple or mini carrots, or a turkey sandwich should have less turkey and more lettuce, tomato, and other vegetables added).

## **Background on Intervention Strategies**

Communities should coordinate efforts to promote the *5 A Day for Better Health* Program to encourage all Americans to eat 5 to 9 servings of fruit and vegetables daily and to create food environments where choosing more fruits and vegetables becomes an easy, appealing choice, and to advance state and local policies that advance these goals. Activities should draw upon the capacity of existing agency programs and partnerships promoting nutrition at the State and local levels, enhancing and expanding intervention delivery channels, and increasing the availability and use of sound data for evaluation purposes. Commonly used strategies are based on selected evaluated interventions conducted in various settings including worksites, community, faith-based, health care and schools. Strategies are listed by approach: environmental and policy change, direct service or training, and communication (education). A combination of strategies is more likely to provide supportive environments for healthy dietary choices.

## **Effectiveness of Strategies to Promote Vegetable and Fruit Consumption**

Although the relationship of eating vegetables and fruits to reducing the risk of certain types of cancers and chronic diseases is clear, effective strategies that result in increased vegetable and fruit consumption are not so clear. Strategies have focused predominantly on behavior change prompted by communications to increase knowledge and understanding. While few of these strategies have been vigorously evaluated, particularly for actual behavior change, even less is known about effective strategies to increase accessibility through service delivery, environmental and policy interventions.

Goal setting and small groups seem to be particularly promising intervention components for modifying dietary behavior (Ammerman et al., 2002). Statistically significant increases in vegetable and fruit intakes have been reported more frequently for intervention studies based on theory than for those not based on theory (Agency for Healthcare Research and Quality, 2000). Increases in consumption have been modest with an average increase of about 0.6 servings per day (Ammerman et al., 2002). Theory based interventions include “underlying themes of readiness to change, perceived benefits and barriers to change, perceived health risk, self-efficacy or confidence regarding behavioral change, and interaction between the individual and socio-cultural environment” (Ammerman et al., 2002; Glanz et al., 2002). Theoretical models that have shown promise for 5 A Day interventions include: Transtheoretical Model/Stages of Change (Prochaska et al. 1992); (Campbell MK, et al., 1999); Social Cognitive Theory (Bandura A., 1986); and, PRECEDE-PROCEED (Green LW, et al., 1991).

## **Environmental and policy strategies**

Because individual nutrition behavior change strategies are expensive, very labor intensive, and have been successful in only select populations, nutrition environment and policy interventions encouraged to improve and to sustain healthy nutrition behaviors at a population level. The effectiveness of these types of strategies needs further documentation to support broad implementation. An environmental intervention is one where changes are made to the availability of, access to, pricing of, or education information about foods at the point of purchase. A policy intervention is one where laws, regulations, formal, or informal rules and

understandings are adopted on a collective basis to guide individual and collective behavior. Environmental and policy strategies currently used include

- Availability of fruits and vegetables has been increased by adding salad bars to school and worksite cafeterias, providing whole fruit or cut fruits and vegetables in school or work site cafeterias, and by adding fruit to refrigerated vending machines.
- Access to fruits and vegetables has been increased by having farmers promote their crops within worksites and bring purchased produce to workers as they leave for home.
- Pricing of fruits and vegetables has been lowered in school and worksite cafeterias to promote purchases and coupons for fruits and vegetables at farmers' markets have been given to WIC participants, seniors, as well as general population groups.
- Nutrition education information about foods, including fruits and vegetables, has been provided in schools, worksites, restaurants, and grocery stores to promote purchase of lower calorie items.

### **Direct service or training strategies**

Direct service strategies include the following selected examples.

- Cafeteria and worksite promotional events
- Cookbooks
- Cooking demonstrations and/or hands-on food preparation
- Coupons for vegetables and fruit
- Computerized assessment of menus, menu items, individual diet records
- Cash incentives
- Discussions with health care provider
- Farmers' market or grocery coupons offered, orders taken, on-site delivery and sales
- Food service staff training
- Lay health advisors
- Monthly produce giveaways
- Motivational interviewing, goal-setting and tailored action plans
- Taste testing

### **Communication strategies**

Communication strategies include the following selected examples.

- 5 A Day logo cues on incentive items such as magnets, pens, book covers, bags
- 5 A Day media materials such as brochures and fliers, bulletins tailored for worship services, calendars, marketing boards, posters, public service announcements, table tents, and videos
- Cancer Information Service hotline
- Cookbooks, recipe cards
- Curriculum with multiple lesson plans for schools, worksites, faith-based groups
- Discussion series, workshops and educational sessions, including nutrition sessions led by

- peers
- Displays
- Mail and telephone follow-up
- Monthly promotions
- Newsletters
- Self-help manuals
- Support materials for mailings including clue cards, photonovella

### **Consistency with the National 5 A Day Program**

The Centers for Disease Control and Prevention has joined a national partnership of public and private organizations that promote the 5 A Day program. This partnership began with the National Cancer Institute and the Produce for Better Health Foundation, but has expanded to include many other organizations, including the U. S. Department of Agriculture, the American Cancer Society, and State departments of health. Guidelines for State and local program components as well as the use of the logo and other resources provided by all partners may be accessed from the web: CDC ([www.cdc.gov/nccdphp/dnpa/5aday/index.htm](http://www.cdc.gov/nccdphp/dnpa/5aday/index.htm)), National Cancer Institute ([www.5aday.gov](http://www.5aday.gov)), and the Produce for Better Health Foundation ([www.5aday.com](http://www.5aday.com))\*

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## Attachment 6

### **Breastfeeding — Strategy for Reducing Childhood Overweight, Diabetes and Asthma**

#### **Rationale**

Breastfeeding with its many benefits for mothers and babies is recognized as a way to reduce childhood overweight and related chronic diseases. There is a growing body of evidence, which suggests that breastfeeding offers protection against childhood overweight. Several studies (Armstrong, 2002; Hediger, 2001; Gillman, 2001; VonKries, 1999) provide evidence that any breastfeeding and breastfeeding for longer durations protect against overweight in childhood, although the mechanism by which this protection occurs is not clearly understood. The protective effect has been observed in young children and adolescents. A number of studies conducted recently show that the prevalence of overweight in childhood is lower among children (3 to 6 years of age) who were breastfed compared to children who were never breastfed (Hediger, 2001; VonKries, 1999). For older children (9 to 14 years of age) the risk of becoming overweight (BMI > 95<sup>th</sup> percentile) was lower for children who were exclusively or mostly breastfed when compared to children who were fed mostly formula. (Gillman, 2001) Older children who were breastfed at least 7 months were also 20 percent less likely to be overweight than children who were breastfed at least 3 months (Gillman, 2001). A similar outcome has been observed in studies involving younger children (VonKries, 1999). Despite the need for a better understanding of the relationship between breastfeeding and childhood overweight, a number of studies conclude that promoting breastfeeding would be a reasonable strategy for reducing childhood overweight.

In addition to nutrition and growth benefits, breastfed infants have lower rates of asthma and diabetes (DHHS, 2000). The prevalence of diabetes continues to rise in the United States and is problematic for adults and children. Up to a ten fold increase in newly diagnosed cases of type 2 diabetes has been reported among adolescents in some areas of the United States (Dabelea, 1999). Introduction of cows milk to the infants diet before 4 months of age is reported to increase the risk of subsequent type I diabetes 1.5 times (Gerstein, 1994). Infant feeding studies suggest short duration of breastfeeding or early exposure to cows milk may be a determinant of insulin dependant diabetes as well as asthma, a common disease affecting children and young adults (DHHS, 2000). On the other hand research suggests that exclusive breastfeeding for at least the first 4 months is preventive for asthma and other allergies in children who are susceptible to environmental influences that trigger the onset of the disease (Bjorksten, 1990). A study examining the association between asthma, cow's milk protein, and other factors reported that children who were breastfed experienced a lower incidence wheezing that persists until age 7 (Burr, 1993). Other studies considering the relationship between breastfeeding and atopic diseases, including asthma, concluded that breastfeeding is protective against these diseases throughout childhood and adolescence (Saarinen, 1995). Given the study findings noted here, it is reasonable to expect that increased breastfeeding would contribute to lowering the prevalence



of chronic diseases like asthma and diabetes.

The *Healthy People 2010* objective is to have at least 75 percent of mothers breastfeeding during the early postpartum period and 50 and 25 percent breastfeeding at 6 months and 1 year, respectively (DHHS, 2000). Despite increased emphasis on breastfeeding in the United States during the last ten years, only 64 percent of mothers breastfed their infants during the early postpartum period in 1998 (DHHS, 2000). For the same time period 29 and 16 percent of mothers breastfed their infants at 6 months and 1 year, respectively; and the rates are lower for African American and low-income women (DHHS, 2000).

## **Breastfeeding Promotion Strategies**

A systematic review of studies examining breastfeeding promotion programs was conducted to determine which interventions or activities resulted in an increase in incidence and duration (Fairbanks, 2000). Breastfeeding education, peer support and policy changes in the hospital and workplace were reported to impact breastfeeding incidence and duration rates. Listed below are some examples of evidence-based interventions for healthcare, environmental policy, the community along with suggested activities for surveillance and evaluation.

### **Healthcare**

**Breastfeeding education** refers to the provision of factual or technical information about breastfeeding given by a lactation consultant or trained health professional. Education may be provided in small groups or individually during the prenatal or postpartum period. Specific topics include the benefits of breastfeeding, prenatal breast care, common problems and how to overcome them. Videos, posters, pamphlets and other materials may be used in the education effort.

**Peer support** refers to the provision of support and advice on breastfeeding. This support is usually provided by mothers who have breastfed and received training as a peer counselor. Peer support may be offered during the prenatal and postpartum period and contacts may be provided via home visit or telephone.

**Ten Steps to Successful Breastfeeding** refers to the implementation hospital and maternity care policies and practices outlined by the World Health Organization and the United Nations Children's Fund (WHO/UNICEF, 1989). Policies based on the ten steps, which are listed below, may be implemented as a single intervention such as rooming-in or a package of interventions such as rooming-in, early initiation and breastfeeding education.

- A written breastfeeding policy that is communicated to all healthcare staff.
- Staff training in the skills needed to implement the policy.
- Education of pregnant women about the benefits and management of breastfeeding.

- Early initiation of breastfeeding.
- Education of mothers on how to breastfeed and maintain lactation.
- Limited use of any food or drink other than human breastmilk.
- Rooming-in.
- Breastfeeding on demand.
- Limited use of pacifiers and artificial teats.
- Fostering of breastfeeding support groups and services.

**Training** of healthcare professionals refers to the provision of professional training on breastfeeding management to physicians, nurses, nutritionists and other healthcare providers.

### **Environment and Policy**

**Breastfeeding information and services** refers to the provision of information to all employees and the implementation of policies to create a supportive environment for breastfeeding women in the workplace.

**Breastfeeding Mothers Room in the Workplace** refers to the provision of adequate break time and a private space for expressing milk in an environment that enables mothers to continue breastfeeding as long as mother and baby desire.

### **Community Interventions**

**Social Marketing and Media campaigns** target a wide audience and involve the use of a public medium such as television, press, newspapers, and magazines. Campaigns directed towards fathers and others who influence the woman's decision to breastfeed are appropriate.

### **Surveillance and Evaluation**

To determine the impact on breastfeeding initiation and duration rates the interventions employed should be evaluated. Existing data sources such as the Pediatric Nutrition Surveillance System, Pregnancy Risk Assessment Monitoring System, and birth certificates may be used to monitor breastfeeding rates.

### **Findings from the Systematic Review**

Breastfeeding education, peer support and policy changes in the hospital and workplace were reported to impact breastfeeding incidence and duration rates. Breastfeeding education was reported to be effective in increasing rates in women from different income and ethnic groups

while peer support programs were particularly effective among low-income women. The evidence suggests that training to health care professionals can result in increased knowledge.

Multifaceted interventions involving a combination of interventions such as breastfeeding education, peer support, media campaigns and/or policy changes in the healthcare sector have been determined to be effective in increasing both incidence and duration rates. Similarly hospital and maternity care policies implemented as a single intervention or in combination with others also impact breastfeeding rates.

The challenge presented by the call for increased breastfeeding rates underscores a need for stronger support and facilitation of breastfeeding in healthcare, environmental policy, the community and continued surveillance and evaluation. At a minimum applicant communities should collaborate with internal and external partners including local breastfeeding coalitions, hospital authorities, state and/or local health departments and other groups involved in promoting breastfeeding.

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## Attachment 7

### Reduce Television Time in Children

#### Rationale

National cross-sectional surveys have shown a positive association between the number of hours children watch television and prevalence of overweight (Andersen, et al., 1998, Crespo et al, 2001; Dennison, et al, 2002; Dowda, et al., 2001). For example, an analysis of the Third National Health and Nutrition Examination Survey of children aged 8 to 16 years found that the prevalence of overweight was lowest among children watching 1 hour or less and highest among those watching 4+ hours a day (Crespo, 2001). Longitudinal and experimental studies have suggested a causal relationship between increased television hours and overweight in children (Gortmaker, et al., 1996; Robinson, 1999). In a nationally representative study of children aged 10–15 years, Gortmaker and colleagues (1996) showed a dose-response relationship between hours of TV and change in body weight in girls. Two school-based studies using randomized controlled trial designs showed that children who reported a decrease in time watching TV also showed a reduction in overweight (Gortmaker, 1999; Robinson, 1999).

The *Healthy People 2010* Objectives include the objective to increase the proportion of adolescents who view television two or fewer hours on a school day (objective 22-11). The 2001 *Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity* recommended that children watch no more than two hours of television a day (<http://www.surgeongeneral.gov/topics/obesity/>).

Television viewing is the most common sedentary activity of children in the United States. On average, children aged 2–17 years spend approximately 4.5 hours a day watching some kind of screen, with 2.5-2.75 hours of that spent watching television (Roberts, et al., 1999; Woodard and Gridina, 2000). Television time varies with age. Children aged 2–7 years watch an average two hours a day, while those aged 8–13 watch an average of almost 3.5 hours, and those aged 14–18 watch approximately 2.75 hours a day (Roberts, 1999). Boys watch more television than girls, children in lower SES families watch more than those in higher SES families, and African American children and adolescents watch more hours of television than do Hispanics, who, in turn watch more than Caucasian children and adolescents (Crespo, 2001, Roberts, 1999; Woodard and Gridina, 2000).

The mechanisms for the relationship between television time and overweight have not been clearly determined. Proposed mechanisms include: television watching may displace physical activity, children may have increased caloric intake while watching TV, children who watch more television may be influenced by advertisements to request, buy or consume more high calorie foods and more snacks, and TV viewing may reduce metabolic rate (Clancy-Hepburn, et al., 1974; Crespo, et al., 2001, Gortmaker, et al. 1996; Robinson, 1999, Robinson 2001).

Studies have linked TV use to factors in the family and the home (Roberts, 1999; Woodard and Gridina, 2000). Children who have a television in their bedroom spend more time watching television. Children who live in a home where the TV is on all the time, and those who spend

more than half their TV time watching alone tend to watch more. Parental behavior also is associated with TV time. Children watch less TV if they have parents who watch less television themselves, monitor TV closely, are more consistent in TV viewing rules, and know more about the media and media effects (Brown, et al., 1990; Gentile and Walsh, 2002; Woodard and Gradina, 2000).

### **Evidence-based Intervention Strategies**

Few interventions to reduce television watching have been reported in the literature. One clinic-based and three school-based interventions have resulted in decreases in reported TV time among children exposed to the interventions.

A pilot intervention in an urban community clinic in Atlanta used counseling alone and counseling along with providing a behavioral intervention and TV time manager. Both groups showed a decrease in reported TV time. (Ford, et al, 2002).

The “Planet Health” intervention in Boston used an interdisciplinary curriculum addressing TV watching, promoting fruit and vegetable intake, lowering high fat food intake, and increasing physical activity for use in grades 6–7 (Gortmaker, et al., 1999a).

The “Eat Well, Keep Moving” program in Baltimore developed materials addressing diet, TV watching, and physical activity to use in classrooms with children in grades 4–5 (Gortmaker, et al., 1999b).

A school-based intervention in San Jose, California incorporated lessons on television, videotape, and video game self-monitoring and reduction into the curriculum for children in grades 3 and 4, distributed newsletters to parents, and provided electronic monitors that controlled power to the television to all households in the study. (Robinson, 1999).

### **Innovative Ideas for Testing in States**

Although more testing of interventions and approaches is needed on this topic, some promising approaches follow.

#### Healthcare setting

- Counseling by health providers
- Training for health care professionals

#### Preschool, day care, and after-school settings

- Curriculum-based approaches aligned with state and national educational standards
- Media literacy
- Approaches addressing both children and their parents

## Family and Community

- Social marketing campaigns
- Interventions with parents to reduce their own television watching
- Parenting programs addressing parental monitoring and setting of rules (e.g., no television in the child's bedroom, not leaving the TV on all the time, not letting children watch TV alone, not watching TV during meals)
- Providing more safe and engaging activities for children to do instead of watching TV

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## Attachment 8

### Social-Ecological Model

Changing multiple levels of society to promote health and prevent/control obesity and other chronic diseases requires several approaches. Rather than focusing solely on personal behavioral change interventions with groups or individuals, a blend of individual and environmental strategies are required. Whether the targets of interventions are individual students, employees, community citizens, corporate presidents, or legislators, each is surrounded by interpersonal social networks comprising families, friends, colleagues, and acquaintances. Each layer of social structure (whether individual, interpersonal, organizational, community, or societal) affects the others above and below it, from the inside outward or the outside inward. Change one level and multiple levels may experience change. Each of the five major levels of social structure calls for a blend of intervention strategies and methods. For interventions to be most successful, many levels of social structure must be supportive of the change. And perhaps the most effective and comprehensive interventions occur when individual and environmental strategies are directed at several levels of social structure simultaneously (Abrams 1991; Gottlieb and McLeroy 1994). Increasingly, health promotion professionals are recognizing the dynamic interplay, which exists between individuals and their environments. Although lifestyle choices are ultimately personal decisions, they are made within a complex mix of social and environmental influences which affect health behaviors by making healthier lifestyle options more readily accessible, affordable, comfortable, and safe (Green and McAlister 1984; King 1991; King et al. 1995).

Research has shown that behavior change is more likely to endure when both the individual and the environment undergo change simultaneously (Lasater et al. 1984; Abrams 1991). Together, the two approaches create synergy, having a far greater influence on individuals, organizations, communities, and society as a whole than either individual or environmental strategies could alone. Therefore, interventions, which address not only individual intentions and skills, but also the social and physical environmental context of a desired behavior, considering as well all social networks and organizations that share that environment, have the potential for population-wide impact (Stokals 1996).

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## Attachment 9

### Social Marketing Overview

Social marketing is “the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behavior change of target audiences in order to improve their personal welfare and that of their society.” (Andreasen, 1995, p. 7). Research has shown social marketing’s effectiveness in a variety of health arenas including general health, injury prevention, protecting the environment, and community involvement (Kotler, Roberto, and Lee, 2002).

There is a great deal of confusion about what social marketing is, and what it is not. Health promotion campaigns that use approaches from education, communication, and advertising are often mislabeled as social marketing (Andreasen, 1995). While social marketing can incorporate aspects from each of these fields, it is a broader approach. The social marketing planning process can be used to address health issues at all levels of the social ecological model—individual, interpersonal, organizational, community, and societal — addressing, for example, individual knowledge, attitudes, perceptions, and self-efficacy as well as social support, environment, and policies that help or hinder the desired behavior.

Social marketing approaches health problems in several unique ways. Campaigns that use this planning process include the following features:

- *Audience orientation*—To create an effective social marketing campaign, planners must thoroughly understand how their audience views the health problem and proposed solutions to it. Qualitative and quantitative research on audience knowledge, attitudes, beliefs, behaviors, needs, and desires will drive the rest of the planning process.
- *Audience segmentation*— The U.S. population is very diverse, which makes identifying and addressing smaller, more homogeneous audience segments essential for a successful intervention. Audiences can be segmented according to a number of variables including current behavior, future intentions, readiness to change, demographics, and where they can be reached, among others.
- *Focus on behavior change*—Social marketing campaigns aim for the end result of behavior change rather than changes only in knowledge, attitudes, beliefs, etc. Social marketing formative research examines what can prevent or help people in the audience segment to adopt a healthier behavior and also looks at the perceived benefits and costs of competing behaviors in developing strategies.
- *Continual feedback and monitoring*—As social marketing focuses on *behavior change*, especially sustainability of that behavior change, continual information is needed on how the audience is responding to the intervention. This information is needed to help develop the campaign (pretesting), and to refine the campaign and make mid-course revisions, rather than waiting to reflect on this feedback until the very end.

## **The Social Marketing Process**

The social marketing process includes four stages: analysis, strategy development, implementation, and evaluation (described below). Social marketing makes its unique contribution in the analysis and strategy development stages. The implementation and evaluation stages are similar to those used in other planning processes.

### **Analysis**

This stage begins with a combination of qualitative and quantitative research on audience behaviors, attitudes, beliefs, and knowledge on the health issue. Also, it can be helpful to review research that has already been done on the audience or topic area. The goal is to understand as much as possible about the audience in relation to the health problem and possible solutions and to develop an intervention that is oriented toward this audience.

In many cases, this is the stage at which a decision is made about what audience segment will be addressed. Further formative research with this audience can then help planners make important decisions such as determining realistic behavioral objectives, the factors that influence behavior, effective information and service delivery channels, and effective intervention strategies (at the individual through the societal levels).

### **Strategy Development**

Once the planner has a thorough knowledge of the health problem, the behavior, the audience, and the context, he or she needs to make decisions about what strategies will be most likely to lead to behavior change, considering relevant factors at all levels of the social ecological model. Social marketers develop strategies in terms of the product they will offer, the perceived price of this product, where they will offer the product, and how they will promote it. These “4 Ps” are described in more detail below:

- Product refers to what the intervention is offering the audience or what they are encouraged to do. It can be a behavior, service, idea, or tangible item.
- Price is the cost of adopting the behavior, service, idea, or item (e.g., money, time, pleasure, loss of self-esteem, embarrassment, etc.).
- Place refers to distribution channels for any communication messages, but also takes into consideration environmental and policy factors associated with the behavior.
- Promotion is the communication or education component of the intervention.

### **Implementation and Evaluation**

These stages in social marketing interventions are similar to those in other planning processes. Implementation considers promotion, place, and policy issues. Process and impact evaluation are used to assess the effectiveness of social marketing interventions. We want to know how well the campaign is being implemented, and to what extent it is producing desired effects—in social marketing, the endpoint will be behavior change.

### **Resources**

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National Cancer Institute. *Theory at a glance: A guide for health promotion practice* (NIH Publication No. 95-3996). Bethesda, MD: U.S. Department of Health and Human Services, 1995.

Rothschild ML. Carrots, sticks, and promises: A conceptual framework for the management of public health and social issue behaviors. *Journal of Marketing* 1999;63:24–37.

The Robert Wood Johnson Foundation's National Turning Point Initiative Web site has information and resources on social marketing.

[www.turningpointprogram.org/Pages/socialmkt.html](http://www.turningpointprogram.org/Pages/socialmkt.html) \* (accessed April 11, 2003).

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## Attachment 10

### Nutrition and Physical Activity Recommendations by the American Cancer Society, American Diabetes Association, and the American Heart Association

This table shows the areas of recommendations covered by the American Cancer Society (ACS), American Diabetes Association (ADA), and the American Heart Association (AHA) for dietary factors and physical activity. Please see the references for details on each recommendation.

Component Area	ACS	ADA	AHA
Calories	X	X	X
Dietary Fat	X	X	X
Fruits and Vegetables	X	X	X
Alcohol	X	X	X
Whole Grains	X	X	X
Physical Activity	X	X	X
Salt			X

#### References

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## Attachment 11

### Collaborating with Partners on Secondary Prevention Strategies

Communities need to integrate secondary prevention strategies and activities into their plans, partnerships, policy and environmental changes, and training for health professionals to ensure that recognized national guidelines are followed. Activities include improving the delivery of secondary prevention practices and collaborating with partners on professional education and policy and practice changes related to the implementation of the guidelines or standards of care for obesity. Selected guidelines and resources include

National Heart, Lung, and Blood Institute's *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* Available at [http://www.nhlbi.nih.gov/guidelines/obesity/ob\\_home.htm](http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm) (accessed April 11, 2003).

*Guide to Clinical Preventive Services*, 3<sup>rd</sup> Edition, 2000-2003 Report of the U.S. Preventive Services Task Force (<http://www.ahrq.gov/clinic/cps3dix.htm>). See the healthy diet and physical activity counseling recommendations at <http://www.ahrq.gov/clinic/3rduspstf/diet/dietrr.pdf> and <http://www.ahrq.gov/clinic/3rduspstf/physactivity/physactrr.pdf> (files accessed April 11, 2003).

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Overweight Children and Adolescents: Recommendations to Screen, Assess and Manage. Available at <http://www.cdc.gov/nccdphp/dnpa/growthcharts/training/modules/module3/text/contents.htm> (accessed April 11, 2003).

Maternal and Child Health Bureau expert committee recommendations on obesity evaluation and treatment of children. *Pediatrics* 1998;102(3):e29. Available at <http://www.pediatrics.org/cgi/content/full/102/3/e29> \* (accessed April 11, 2003).

*Bright Futures in Practice: Physical Activity*. Guidelines and tools that emphasize health promotion, disease prevention, and early recognition of physical activity issues and concerns of infants, children, and adolescents at <http://www.brightfutures.org/> \* (accessed April 11, 2003).

*Bright Futures in Practice: Nutrition*. Nutrition guidelines that provide a thorough overview of nutrition supervision during infancy, childhood, and adolescence and also show how partnerships can improve nutritional status at <http://www.brightfutures.org/> \* (accessed April 11, 2003).

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*Voluntary Guidelines for Providers of Weight Loss Products or Services*

These guidelines, developed by the Partnership for Healthy Weight Management, provide strategies for achieving and maintaining a healthy weight. Available at <http://www.consumer.gov/weightloss/> (accessed April 11, 2003).

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