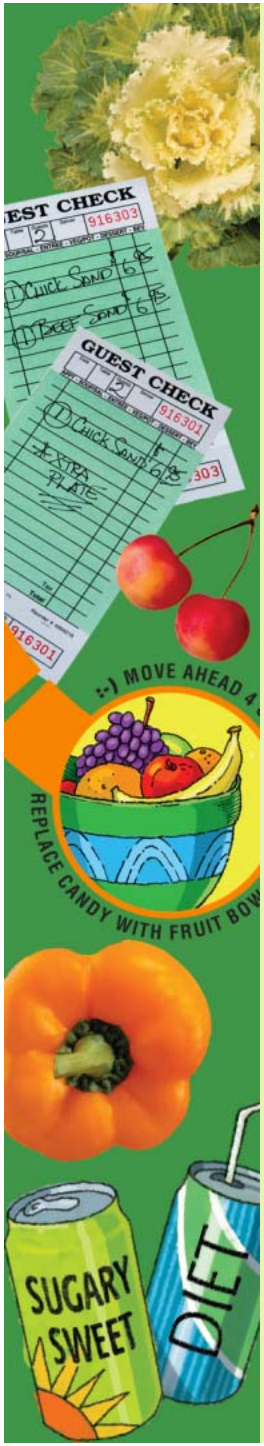
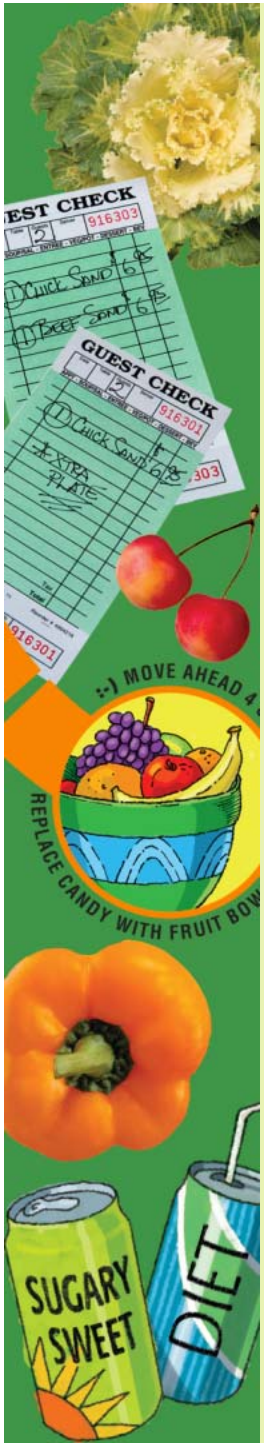


Weight Management Research to Practice Series:

Working with multi-disciplinary teams to translate scientific evidence for different audiences

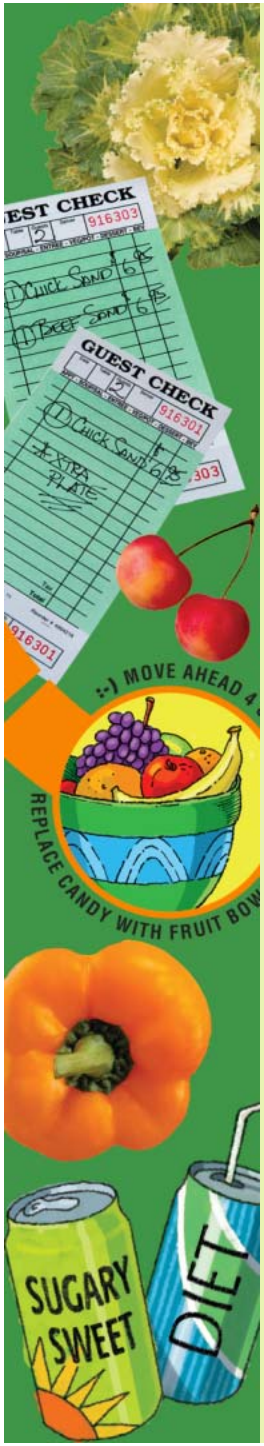
Mary K. Serdula, MD, MPH; Kristen R. Sullivan, MS, MPH; Mary Ann Fenley; Beth Tohill, PhD; Maria Elena Jefferds, PhD; Judith McDivitt, PhD

The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention.



Outline

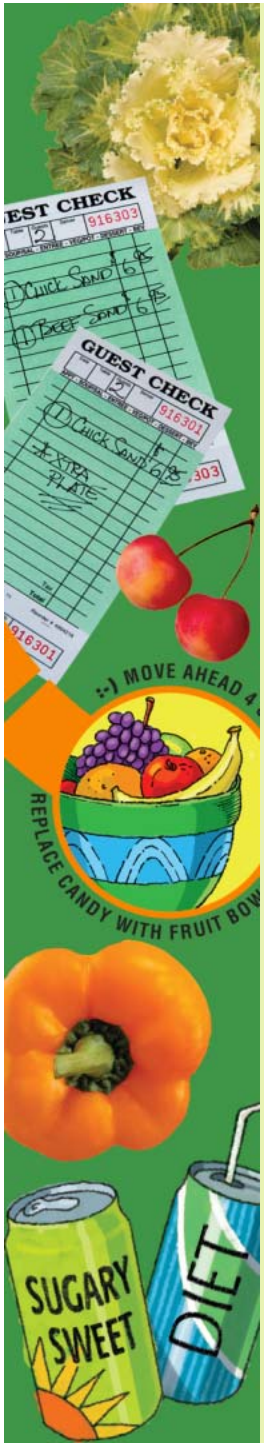
- Describe the series
- Describe the process
- Discuss lessons learned



Purpose

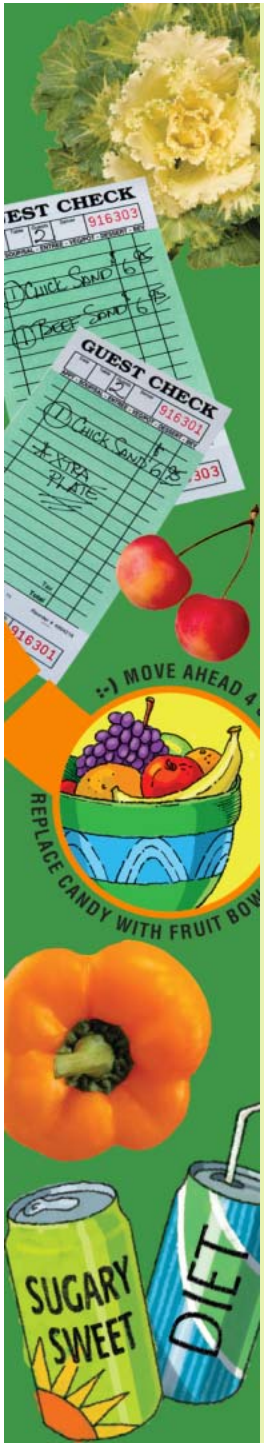
Meet the needs of public health practitioners

- For analysis and interpretation of current evidence supporting relevant topics where science unclear
- For guidance on translating the science into practice
- For supporting materials and tools



Products

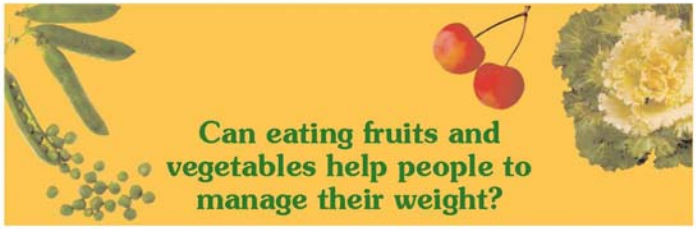
- Practitioner brief - research brief (5 to 10 pages) summarizing evidence
- Power point presentations - for practitioners to use to present science to colleagues, funders, partners, etc.
- Practitioner tool - shorter document (4 to 6 pages) with consumer messages and easy "how to" ideas
- Web pages - of content appropriate for public



Topics

- Fruits and vegetables and weight
- Portion size
- Sugar-sweetened beverages
- Breastfeeding
- Energy density
- Food away from home
- TLC diet
- Weight loss maintenance

Fruit & Vegetable Practitioner Brief



Can eating fruits and vegetables help people to manage their weight?

Summary

Consuming a diet high in fruits and vegetables is associated with lower risks for numerous chronic diseases, including cancer and cardiovascular disease.[1,2] Even so, the impact of eating fruits and vegetables on weight management has not been widely researched. This brief will examine the evidence from available studies to determine whether eating fruits and vegetables can help with weight management. We are providing only the outcomes of these studies, but we encourage you to read the articles themselves to gain many more insights into the health aspects of eating fruits and vegetables.

The research that we cover in this brief will support the conclusion that replacing foods of high energy density (high calories per weight of food) with foods of lower energy density, such as fruits and vegetables, can be an important part of a weight management strategy.

Extensive research has been conducted on the relationships between calories, amount of food eaten and body weight. The association of this information with the role of fruits and vegetables in weight management can be summarized as follows:

- To lose weight a person must eat fewer calories than what he or she expends.
- People may not limit what they consume based on calories alone. Feeling full is one reason that people stop eating. Short-term studies indicate that the volume of food people eat at a meal is what makes them feel full and stop eating, rather than the calorie content of the food.
- At the same calorie level, foods with low energy density provide a greater volume of food, which may help people feel full at a meal while consuming fewer calories.
- Water and fiber increase the volume of foods and reduce energy density. In their natural state, fruits and vegetables have high water and fiber content and thus are low in calories and energy density.
- Fruits and vegetables are good substitutes for foods of high energy density.

Research Review: Eating fruits and vegetables may help manage weight.

Losing weight can be very difficult, even for the highly motivated. In addition, maintaining an appropriate weight is difficult, particularly as a person ages. Health care professionals need to provide sound, scientific information when they advise people to eat foods that help them stay healthy, which includes maintaining a suitable weight. The research community is evaluating the effectiveness of a number of weight loss strategies; however, this brief examines only one strategy: the role that fruit and vegetable consumption may play in weight management.

Very few studies in the literature have investigated whether there is a direct relationship between eating fruits and vegetables and losing weight. The studies in this brief examined many issues such as the relationships of calories, volume of food eaten, types of food eaten (including fruits and vegetables), satiety, and weight reduction. Many of the studies reported on consumption of fruits and vegetables but did so in the context of a larger framework, such as preventing or treating high blood pressure or cardiac disease, but reported on weight loss also.

Research to Practice Series, No. 1

National Center for Chronic Disease Prevention and Health Promotion
Division of Nutrition and Physical Activity

Another study[6] shows how water added to food increases volume and thus its overall impact on feeling full. Twenty-four women ate breakfast, lunch, and dinner in the laboratory 1 day a week for 4 weeks. On 3 days of the 4 days, they were served a dish made of the same ingredients but prepared differently. On 1 day, they were served a chicken-rice casserole; the second, a chicken-rice casserole with a glass of water; on the third chicken-rice soup. The soup was made by adding the water into the casserole ingredients used the day before. Serving size was $1^{1/3}$ cups for the casserole and $2^{1/2}$ cups for the soup. Eating the soup significantly increased the feeling of fullness and reduced the participants' hunger, also significantly reducing the number of calories the women consumed during lunch. Drinking a glass of water with the casserole had no effect on total calories consumed or on feelings of being full.

Other studies have yielded similar findings. In a literature review by Yao and Roberts in 2001,[7] the authors found in short-term studies that eating low-energy-dense foods promoted feelings of being full, reduced hunger, and decreased energy intake regardless of how the food was changed to lower the energy density (such as reducing fat). In the long-term studies they reviewed, eating low-energy-density foods promoted moderate weight loss. In studies lasting longer than 6 months, weight loss was 3 times greater in persons who ate foods of low energy density (low in fat and high in fiber) than in those who simply ate low-fat foods.

Water and fiber in foods increase volume and thereby reduce energy density. In their natural state, fruits and vegetables have high water and fiber content and are low in calories and energy density.

Fat increases the energy density of foods, while water and fiber decrease energy density. Water has the greatest impact on energy density because it adds weight to food without increasing calories, thus decreasing energy density.[8] Most fruits and vegetables are low in energy density because of their high water and fiber content and their low fat content.

The water and fiber content of many vegetables and fruits is well documented. The USDA's Web site on food composition (www.nal.usda.gov/fnic/foodcomp) lists water, fiber, and many other food components (including calories) for hundreds of vegetables and fruits.

The few researchers who have studied the effects of water and fiber in foods have frequently conducted their studies on different forms of fruits (e.g., whole, purée, and juice). The results indicate that fruits can enhance satiety, especially when consumed whole. Researchers in a study[9] comparing different forms of apples, each containing 60 g of sugar, found that whole apples, which contained 2.9% fiber, were associated with higher satiety ratings than was apple purée or fiber-free apple juice. The authors attributed the differences in satiety to the fiber content of the foods and its effects on glucose homeostasis. Another study[10] which compared whole oranges (2.5% fiber) to orange juice (fiber free) and whole grapes (1.3% fiber) to grape juice (fiber free) confirmed that whole fruit provided more satiety than juice. Instead of one serving of orange juice (6 ounces, 85 calories), a person can eat a medium orange and consume only 65 calories and obtain much more fiber and volume.

What is the difference between volume and amount?

In this brief, volume means the same thing as amount; both terms refer to the space occupied in three dimensions, or cubic size. They do not refer to weight.

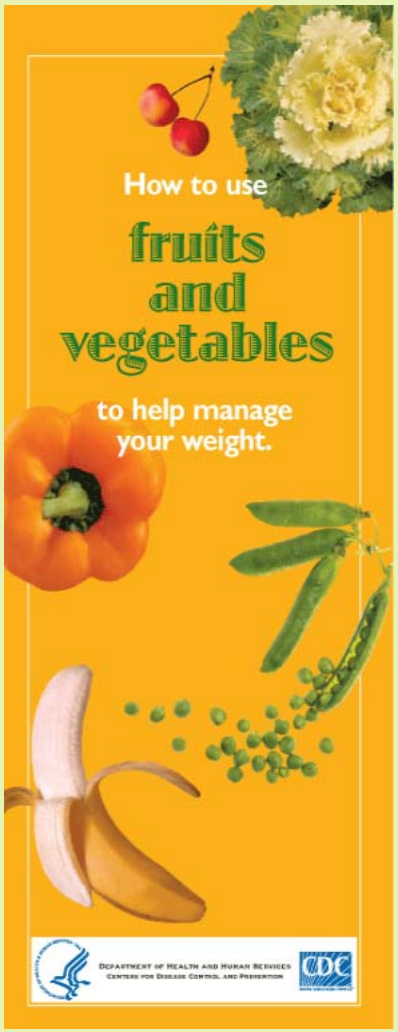
In studies that tested the influence of vegetables on feeling full,[11-14] Gustafsson and colleagues found that adding vegetables (carrots and spinach) to meals with equal calories enhanced the feelings of being full if at least 200 g of vegetable were added. These studies did not distinguish whether the effect was related to the vegetables' fiber and water content or the reduction of energy density of the food. However, the ratings of fullness were correlated positively with the dietary fiber content, the water content, and the total weight of the meal.

Dietary fiber, regardless of the source, has also been linked to weight regulation. A review summarizing the effects of high- versus low-fiber diet interventions found that the high-fiber diets in 20 of 22 studies resulted in weight loss.[15] Using pooled data from 12 of the intervention studies that did not control energy intake, the authors found that the participants on the higher-fiber diets lost significantly more weight than those on the lower-fiber diets. From those same studies it was found that an increase of 14 g of fiber a day was associated with an average weight loss of 1.9 kg (4.2 lb) over 3.8 months. These analyses highlight the importance of fiber-rich foods, such as fruit and vegetables, in weight regulation.

Numerous foods are low in energy density. Among these foods, fruits and vegetables are excellent substitutes for high-energy-density foods.

Fruits and vegetables are good substitutes, in part

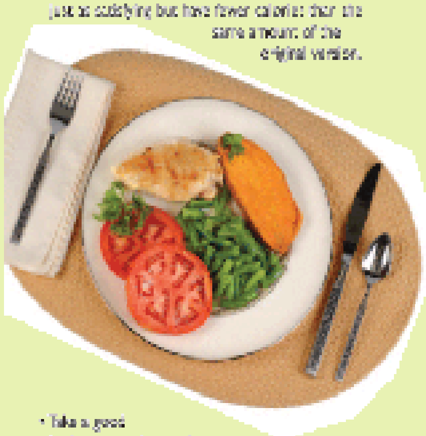
Fruit and Vegetable Practitioner Tool



Fruit and Vegetable Practitioner Tool

Dinner

- Add in 1 cup of chopped vegetables, such as broccoli, tomatoes, squash, onions, or peppers, while removing 1 cup of the rice or pasta in your favorite dish. The dish with the vegetables will be just as satisfying but have fewer calories than the same amount of the original version.



- Take a good look at your dinner plate. Vegetables, fruit, and whole grains should take up the largest portion of your plate. If they do not, replace some of the meat, cheese, white pasta, or rice with legumes, steamed broccoli, asparagus, greens, or another favorite vegetable. This will reduce the total calories in your meal without reducing the amount of food you eat. BUT remember to use a normal- or small-size plate—not a platter. The total number of calories that you eat counts, even if a good proportion of them come from fruits and vegetables.

Smart Snacks

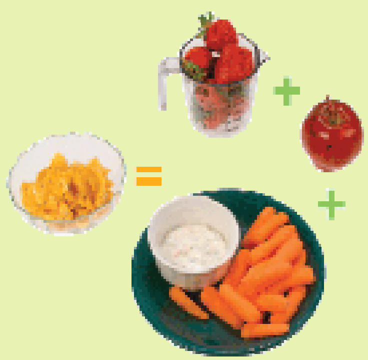
Most healthy eating plans allow for one or two small snacks a day. Choosing most fruits and vegetables will allow you to eat a snack with only 100 calories.

About 100 Calories or Less

- a medium-size apple (72 calories)
- a medium-size banana (105 calories)
- 1 cup steamed green beans (44 calories)
- 1 cup blueberries (83 calories)
- 1 cup grapes (100 calories)
- 1 cup carrots (45 calories), broccoli (30 calories), or bell peppers (30 calories) with 2 tbsp. hummus (46 calories)

The fruits and vegetables in the box above all have about 100 or fewer calories.

Instead of a high-calorie snack from a vending machine, bring some cut-up vegetables or fruit from home. One snack-sized bag of corn chips (1 ounce) has the same number of calories as a small apple, 1 cup of whole strawberries, AND 1 cup of carrots with ¼ cup of low-calorie dip. Substitute one or two of these options for the chips, and you will have a satisfying snack with fewer calories.



Remember: Substitution is the key.

It's true that fruits and vegetables are lower in calories than many other foods, but they do contain some calories. If you start eating fruits and vegetables in addition to what you usually eat, you are adding calories and may gain weight. **The key is substitution.** Eat fruits and vegetables instead of some other higher-calorie food.

Fruits and Vegetables for Weight Control

Eat fruits and vegetables the way nature provided—or with fat-free or low-fat cooking techniques.

Try steaming your vegetables, using low-calorie or low-fat dressings, and using herbs and spices to add flavor. Some cooking techniques, such as breading and frying, or using high-fat dressings or sauces will greatly increase the calories and fat in the dish. And eat your fruit raw to enjoy its natural sweetness.

Canned or frozen fruits and vegetables are good options when fresh produce is not available.

However, be careful to choose those without added sugar, syrup, cream sauces, or other ingredients that will add calories.

Choose whole fruit over fruit drinks and juices.

Fruit juices have little fiber from the fruit. It is better to eat the whole fruit because it contains the added fiber that helps you feel full. One 6-ounce serving of orange juice has 85 calories, compared to just 65 calories in a medium orange.

Whole fruit gives you a bigger size snack than the same fruit dried—for the same number of calories.

A small box of raisins (¼ cup) is about 100 calories. For the same number of calories, you can eat 1 cup of grapes.

Want More Information?

Check out these Web sites for more information about how fruits and vegetables can help you manage your weight:

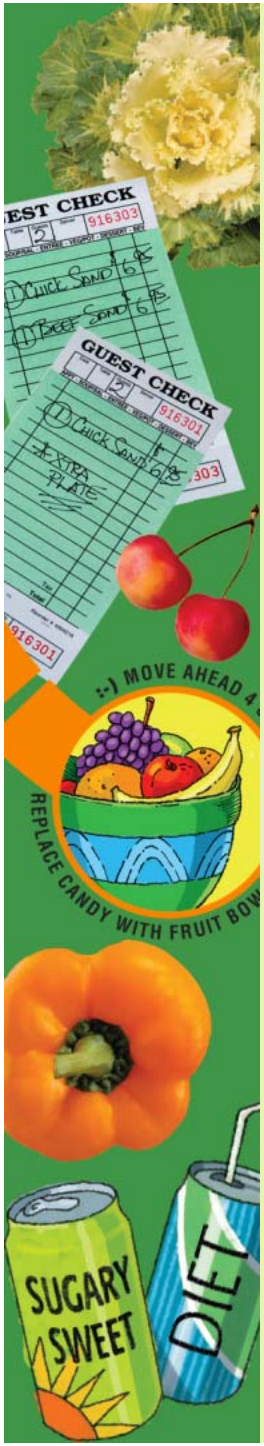
Centers for Disease Control and Prevention
www.cdc.gov/5aday

US Department of Agriculture, Center for Nutrition Policy and Practice
www.usda.gov/cnpp

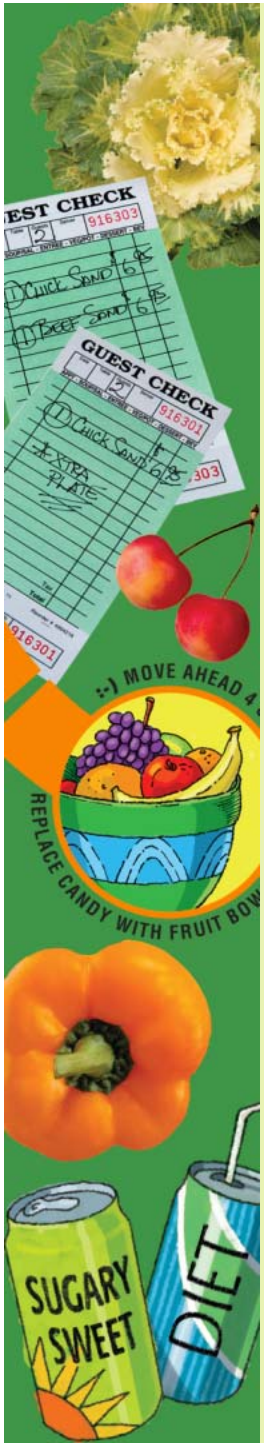
National Cancer Institute
www.5aday.gov

Produce for Better Health Foundation
www.5aday.org

www.healthierus.gov/dietaryguidelines



Can eating fruits and vegetables help people to manage their weight?



There are many proposed strategies for losing or maintaining weight.

This presentation looks at only one strategy: substituting low-energy-dense fruits and vegetables for foods with high energy density in order to lower the number of calories consumed.

References to all studies are in "Can fruits and vegetables help people to manage their weight?" on the CDC Web site: www.cdc.gov/nccdphp/dnpa and in the notes in this electronic PowerPoint presentation.

Portion Size Practitioner Brief

Portion Size: Then and Now

It is no secret that portion sizes, as well as waistlines, in this country are expanding. *The Dietary Guidelines for Americans 2005*[1] urge Americans to pay special attention to portion sizes, which have increased significantly over the past 2 decades. Restaurant meals of all kinds have gotten larger with an emphasis on getting more food for the money. However, the rise of portion sizes is not limited to restaurants alone. Bags of snack foods or soft drinks in vending machines and the grocery store are offered in larger and larger sizes that contain multiple servings while a 1-ounce bag of snack food or an 8-ounce soft drink, which are the recommended single serving sizes, are very difficult to find. Americans are surrounded by larger portion sizes at relatively low prices, appealing to the consumer's economic sensibilities. However, the cost to America's health may be higher than most people realize.

In the section on weight management, the Dietary Guidelines address portion sizes, stating that there are no empirical studies to show a causal relationship between increased portion sizes and obesity, but there are short-term studies showing that controlling portion sizes helps limit calorie intake, particularly when eating high-calorie foods. What is missing from the research is whether people monitor portion sizes and consistently choose to eat recommended serving sizes, thus consuming the appropriate amount of calories for maintaining or losing weight.

The following research review examines what science underlies the notion that large portion sizes have contributed to weight gain among Americans. The research-to-practice section offers ideas to practitioners about how to counsel their patients or clients about portion size.

Research Review

Eat More Than You Use = Weight Gain

The fundamental rule of weight management is that people gain weight when they eat more calories than they expend. Therefore, the number of calories in the amount of food consumed is integral to weight management. Portion size does not matter if the person chooses to eat only an appropriate serving or eats fewer calories in subsequent meals and snacks that allow them to stay within recommended calorie limits. But do people look at food that is offered and automatically assess how much is a normal serving size, and then actually eat only the normal serving size? Do they adjust what they eat after consuming large portion sizes? The research says they may not.

Trends in Increasing Portion Sizes

Restaurants

Eating in restaurants offers many opportunities to encounter large portion sizes. The number of eating establishments in the United States increased by 75 percent between 1977 and 1991.[2] While Americans have many choices in restaurants, the food (especially from fast food restaurants) is often very cheap and available in large quantities.[3,4] A study shows that the frequency of eating out, particularly at fast-food restaurants, is associated with an increase in energy and fat intake and with a higher body mass index.[5]

Eating at Home and Snacks

Even those who do not frequent restaurants are confronted with large portion sizes of prepackaged or convenience foods. Young and Nestle[6] reported on a study examining the current weight of ready-to-eat foods and comparing them with past weights using data from manufacturers. Portion sizes of these foods began increasing in the 1970s and have continued to do so through today to the point where most exceed federal serving size standards.

Nielsen and Popkin[7] compared two cross-sectional surveys using Nationwide Food Consumption Survey data from 1977 and the Continuing Survey of Food Intake by Individuals (CSFII) data from 1989 and 1996-1998 to determine patterns and trends of portion sizes by type of food and eating location. "Key foods" (salty snacks, desserts, soft drinks, fruit drinks, French fries, hamburgers, cheeseburgers, pizza, and Mexican food) were chosen because they had the greatest percent change of energy in the U.S. diet. When data on the key foods were combined, they represented 18 percent of calories consumed in the United States in 1977-1978 and 27.7% of all calories in 1994-1996. The study found that between the survey years, portion sizes and energy intake increased for all key foods except pizza. The portion size increase resulted in an increased caloric intake for salty snacks (93 calories more), soft drinks (49 calories), hamburgers (97 calories), French fries (68 calories), and Mexican dishes (133 calories).

A study by Smiciklas-Wright et al.[8] illustrates the difficultly of assessing whether larger portion sizes are being consistently consumed. Their study of self-reported energy intake of food eaten at home compares quantities per eating occasion (portion size) using CSFII data from 1989-1991 and 1994-1996. The results showed that about one-third of the 107 commonly eaten foods showed significant differences in portion size. The majority of foods with significant differences were larger sizes in 1994 - 1996, including seven types of grains and cereals (e.g., oat rings, pasta, spaghetti with tomato sauce), and 11 beverages, such as orange juice, all soft drinks, beer, wine, and fruit drinks. Smaller portion sizes in 1994-1996 were reported for macaroni and cheese, pizza, chicken, bacon, margarine, and mayonnaise. No foods showed significant differences in portion sizes between the survey years for every age and sex category in this study.

People can compensate for eating larger portions in one eating occasion by eating fewer calories during the rest of the day or the time period before or following the eating occasion. However, this is often difficult for many to do. In some of the studies in this brief,[2,8] the researchers found that the people eating larger portion sizes did not notice the size difference and ate their normal amount of food at the following meal.

Differences in Portion Size and Serving Size

Portion size is the amount of a single food item served in a single eating occasion, such as a meal or a snack. Many people confuse portion size with serving size, which is a standardized unit of measuring foods—for example, a cup or ounce—used in dietary guidance, such as the Dietary Guidelines for Americans. Portion size is the amount offered to a person in a restaurant, the amount offered in the packaging of prepared foods, or the amount a person chooses to put on his or her plate. For example, bagels or muffins are often sold in sizes that constitute at least 2 servings, but consumers often eat the whole thing, thinking that they have eaten 1 serving. They do not realize that they have selected a large portion size that was more than 1 serving.

Portion Size Affects How Much People Consume in an Eating Occasion.

Short-term studies show that people eat more when they are confronted with larger portion sizes. The research studies described in the following cover only one or a few eating occasions in a short time frame. Research studies have yet to assess the impact of portion sizes over longer periods of time. However, the phenomenon of unknowingly eating larger amounts when presented with a large portion is an important aspect of weight management.

A study by Rolls et al.[9] tested how adults responded to meals on different days of four different portion sizes of macaroni and cheese. They found that the bigger the portion, the more participants ate. Participants consumed 30% more energy (162 cal) when offered the largest portion (1000g) compared to the smallest portion (500g). They also reported similar ratings of hunger and fullness after each meal despite the intake differences. After the study, only 45% of the subjects reported noticing that there were differences in the size of the portions served.

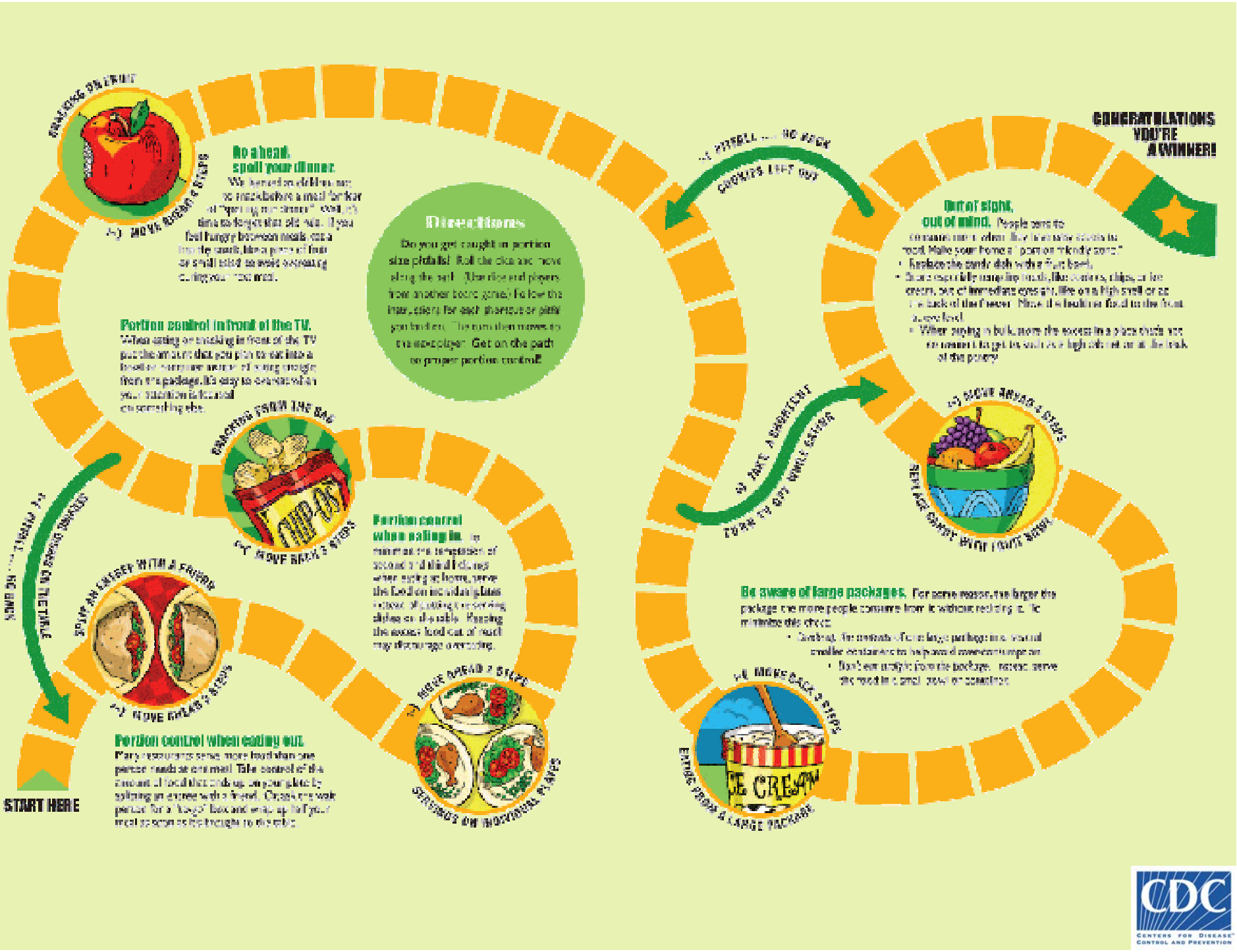
Another study by Rolls et al.[10] gave the same subjects different size sandwiches on several occasions to look at the effect on energy intake of increasing the portion size of a food served as a discrete unit (sandwich). Men and women who were offered different size (6-, 8-, 10-, and 12-inch) sub sandwiches for lunch on four different days ate significantly more as the size of the sandwich offered became larger. A study by Diliberti et al.[11] in a restaurant setting showed that when a pasta entrée was served in different portion sizes on different days, people ate larger amounts when they were given larger portions.

This tendency to eat more when offered more was observed nearly 30 years ago when Pudel and Oetting[12] conducted an observational study in which they served people soup from normal bowls to determine their

Research to Practice Series, No. 2
May 2006
National Center for Chronic Disease Prevention and Health Promotion
Division of Nutrition and Physical Activity

CDC
Centers for Disease Control and Prevention

Portion Size Practitioner Tool



Sugar-Sweetened Beverages Practitioner Brief

Added Sugar and the Contribution of Sugar-Sweetened Beverages to Caloric Intake

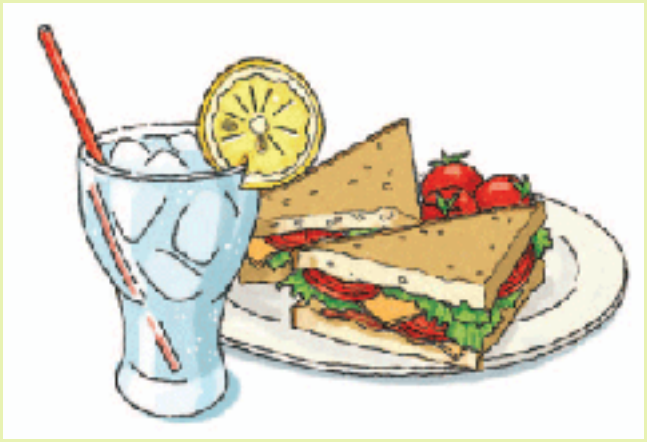
Added Sugars and Sugar-Sweetened Beverages in the American Diet

Research Review: Sugar-Sweetened Beverages and Increased Weight

Observational Studies

Research to Practice Series, No. 3
September 2006

Sugar-Sweetened Beverages Practitioner Tool



When it comes to weight loss, there's no lack of diets promising fast results. There are low-carb diets, high-carb diets, low-fat diets, grapefruit diets, cabbage soup diets, and blood type diets, to name a few. But no matter what diet you may try, to lose weight you must take in fewer calories than your body uses. Most people try to reduce their calorie intake by focusing on food, but another way to cut calories may be to think about what you drink.

What Do You Drink? It Makes More Difference Than You Think!

Calories in drinks are not hidden (they're listed right on the Nutrition Facts label), but many people don't realize just how many calories beverages can contribute to their daily intake. As you can see in the example on the next page, calories from drinks can really add up. But there is good news—you have plenty of options for reducing the number of calories in what you drink.

Sugar-Sweetened Beverages Practitioner Tool

Occasion	Instead of...	Calories	Try...	Calories
Morning coffee shop run	Medium café latte (16 ounces) made with whole milk	265	Small café latte (12 ounces) made with fat-free milk	125
Lunchtime combo meal	20-oz. bottle of nondiet cola with your lunch	227	Bottle of water or diet soda	0
Afternoon break	Sweetened lemon iced tea from the vending machine (16 ounces)	180	Sparkling water with natural lemon flavor (not sweetened)	0
Dinnertime	A glass of nondiet ginger ale with your meal (12 ounces)	124	Water with a slice of lemon or lime, or seltzer water with a splash of 100% fruit juice	0 calories for the water with fruit slice, or about 30 calories for seltzer water with 2 ounces of 100% orange juice.
Total beverage calories		796		125-155

(USDA National Nutrient Database for Standard Reference)

3

Substituting no—or low—calorie drinks for sugar-sweetened beverages cuts about 650 calories in the example on the previous page.

Of course, not everyone drinks the amount of sugar-sweetened beverages shown. Check the list below to estimate how many calories you typically take in from beverages.

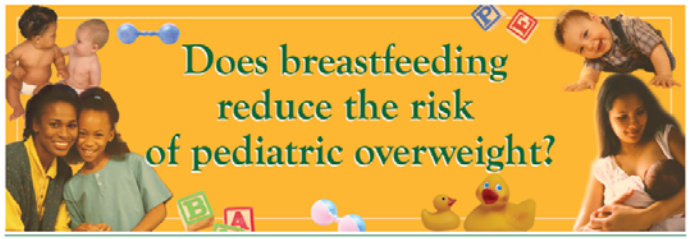
Type of Beverage	Calories in 12 oz	Calories in 20 oz
Fruit punch	192	320
100% apple juice	180	300
100% orange juice	168	280
Lemonade	168	280
Regular lemon/lime soda	148	247
Regular cola	136	227
Sweetened lemon iced tea (bottled, not homemade)	135	225
Tonic water	124	207
Regular ginger ale	124	207
Sports drink	99	165
Fitness water	18	36
Unsweetened iced tea	2	3
Diet soda (with aspartame)	0*	0*
Carbonated water (unsweetened)	0	0
Water	0	0

*Some diet soft drinks can contain a small number of calories that are not listed on the Nutrition Facts label. (USDA National Nutrient Database for Standard Reference)

4

CDC
Centers for Disease Control and Prevention

Breastfeeding Practitioner Brief



The beneficial effects of breastfeeding children are well documented and include a lower risk for ear[1] and respiratory infections,[2] gastroenteritis,[3] and necrotizing enterocolitis,[4] and enhanced cognitive development.[5] For mothers, benefits of breastfeeding include decreased risk of postpartum depression,[6] breast,[7] ovarian,[8,9] and endometrial cancers.[10] Breastfeeding also benefits mothers by speeding the return of uterine tone,[11,12] stopping post-birth bleeding,[11] and temporarily suppressing ovulation, which aids the spacing of children.[11,13] Potentially there is still another benefit, which involves pediatric weight status.

The health of American children is being threatened by overweight and the conditions that may stem from this problem, such as elevated serum lipid and insulin concentrations,[14,15] elevated blood pressure,[14] type 2 diabetes,[16] and psychosocial problems.[17] This Research to Practice (R2P) brief explores the relationship between breastfeeding and pediatric overweight, and it specifically examines:

- The relationship between breastfeeding and lower risk of pediatric overweight and how this relationship may be influenced by factors such as duration, exclusivity, and age at follow-up.
- Possible explanations for the association of breastfeeding with reduced risk of pediatric overweight.
- Recent surveillance data on initiation, duration, and exclusivity of breastfeeding.
- Research to Practice: Evidence-based interventions to promote breastfeeding.

Research Review: Breastfeeding and Pediatric Overweight

In 1981, Kramer[18] reported a significantly reduced risk for overweight among children who were breastfed. Since that report, several studies have provided varying degrees of support for this effect. This variation may be due in part to differences in study design, the populations studied, sample size, definitions of breastfeeding and overweight, length of follow-up, reporting bias, and control of confounding factors. In 2004 and 2005, three groups of researchers, Arenz et al.,[19] Owen et al.,[20] and Harder et al.,[21] published the results of meta-analyses that examined the relation between breastfeeding and pediatric overweight using mostly studies conducted in developed countries. This R2P scientific brief will review the findings of these three meta-analyses.

Arenz et al.[19] were more restrictive than the other two groups, as they required population-based cohort, cross-sectional, or case-control studies; adjustment for at least three confounding variables; odds ratios (ORs) or relative risks; follow-up for 5 to 18 years; feeding mode reported; and use of one of three cutoffs of BMI (body mass index) percentile as their definition of obesity. Arenz et al.[19] included just nine studies, all published between 1997 and 2003.

Owen et al.[20] excluded duplicate reports of results but did not require an adjusted OR or control for covariates. They allowed any definition of overweight or obesity and included historical cohort, prospective cohort, cross-sectional, and case-control study designs. They also included some studies with a shorter follow-up than Arenz et al.[19] Owen et al.[20] included a total of 28 studies with 29 estimates of effect (one paper reported the results for two populations) published between 1970 and 2004.

Research to Practice Series, No. 4
March 2007

National Center for Chronic Disease Prevention and Health Promotion
Division of Nutrition and Physical Activity

META-ANALYSIS

"A meta-analysis is a statistical analysis of a collection of studies, especially an analysis in which studies are the primary units of analysis. Meta-analysis methods thus focus on contrasting and combining results from different studies, in the hopes of identifying consistent patterns and sources of disagreement among those results."[44]

Finally, Harder et al.[21] excluded any studies that did not report an OR and 95% confidence intervals (CI s) (or data to calculate them) or the duration of breastfeeding, or that did not compare breastfed to exclusively formula-fed infants. They included cohort and case-control study designs, permitted any definition of overweight or obesity, and did not require an adjusted OR or control for covariates. In addition, they included studies with a shorter follow-up than Arenz et al.[19] Harder et al.[21] included 17 studies published between 1979 and 2003.

Limitations of these meta-analyses include the use of observational studies, combining cross-sectional studies with longitudinal studies, differing definitions of overweight and obesity and anthropometric references, and analyses that did not always account for covariates. Because the three groups conducted their reviews during similar periods and included many of the same studies, it is not surprising that they reported similar findings.

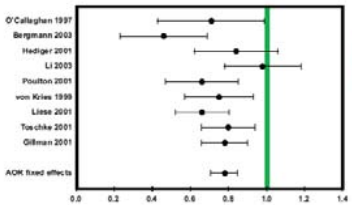


Figure 1. Effect of breast-feeding vs formula feeding on childhood obesity: covariate-adjusted odds ratios of nine studies and pooled odds ratio.

Reprinted with permission from Macmillan Publishes Ltd: Arenz et al., Int J Obes Relat Metab Disord 2004;28:1247-1256, copyright 2004.

Is breastfeeding associated with a reduced risk of pediatric overweight?

Arenz et al.[19] and Owen et al.[20] both reported that initiation of breastfeeding was associated with a reduced risk of pediatric overweight. Arenz et al.[19] found that all nine[22-30] of the studies they included showed reduced odds for overweight among children who were breastfed in a comparison with those never breastfed, although three of these[28-30] showed non-significant effects in the same direction. The meta-analysis of these nine studies showed initiation of breastfeeding resulted in a significant overall reduced risk of overweight (adjusted OR = 0.78, 95% CI = 0.71, 0.85) (Figure 1).[19]

In the Owen et al.[20] review, 28 of 29 estimates showed a lower unadjusted OR of obesity among children who were breastfed than in those who were formula fed. Correspondingly, the meta-analysis found lower odds of obesity among the breastfed children than in the formula-fed children (unadjusted OR = 0.87, 95% CI = 0.85, 0.89). A subanalysis by Owen and colleagues of six studies[22,23,27,29,31,32] showed that when controlling for possible confounders, which included socioeconomic status, parental BMI, and maternal smoking, the significant inverse association between breastfeeding and odds of overweight among children remained but was reduced from 0.86 (95% CI = 0.81, 0.91) to 0.93 (95% CI = 0.88, 0.99).

Does the duration of breastfeeding influence its association with pediatric overweight?

The duration of breastfeeding is inversely related to pediatric overweight. In Harder et al.,[21] the greater the duration of breastfeeding, the lower the odds of overweight. For each month of breastfeeding up to age 9 months, the odds of overweight decreased by 4%. This decline resulted in more than a 30% decrease in the odds of overweight for a child breastfed for 9 months when the comparison was with a child never breastfed.[21]

Does exclusive breastfeeding have a stronger association with pediatric overweight than combined breastfeeding and formula feeding?

Exclusive breastfeeding indeed appears to have a stronger protective effect than breastfeeding combined with formula feeding, but more research is needed. In Owen et al.,[20] the four studies[24,28,33,34] that included exclusive breastfeeding groups showed a stronger protective effect compared to all their other studies combined (OR=0.76, 95% CI=0.70, 0.83). In the Harder et al.[21] review, the two studies[25,28] that documented exclusive breastfeeding also showed a stronger protective effect, decreasing the odds of overweight by 6% for each month of exclusive breastfeeding.

Breastfeeding Practitioner Tool

BOY

Some important reasons to breastfeed your baby...

- Reduced risk of childhood overweight
- Fewer ear infections
- Fewer respiratory infections
- Higher IQ
- Reduced risk of breast cancer for mom
- Reduced risk of postpartum depression

Name _____

Medical Records #_____

Date of Birth _____

Time _____

Blood Type _____

Weight _____ Length _____

Head _____ Chest _____

Baby's Doctor _____

Mother's Name and Room #_____

Mother's Doctor _____

The longer your baby is breastfed, the greater the benefit.

Breastfeeding Practitioner Tool

GIRL

Some important reasons to breastfeed your baby...

- Reduced risk of childhood overweight
- Fewer ear infections
- Fewer respiratory infections
- Higher IQ
- Reduced risk of breast cancer for mom
- Reduced risk of postpartum depression

Name _____

Medical Records # _____

Date of Birth _____

Time _____

Blood Type _____

Weight _____ Length _____

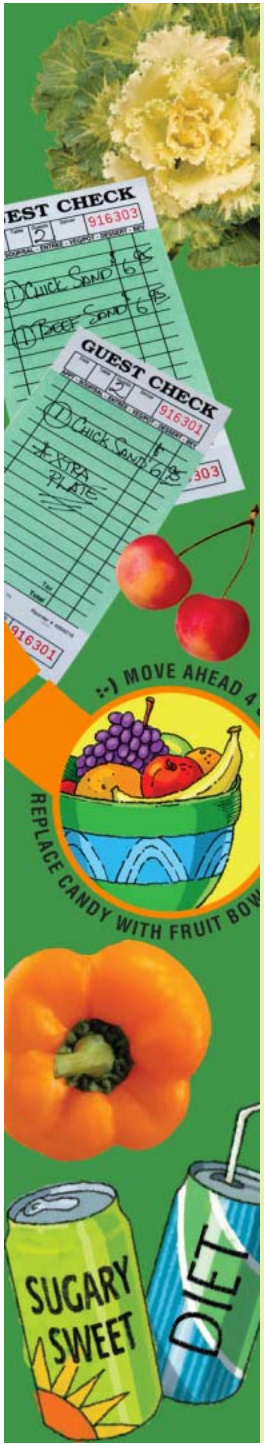
Head _____ Chest _____

Baby's Doctor _____

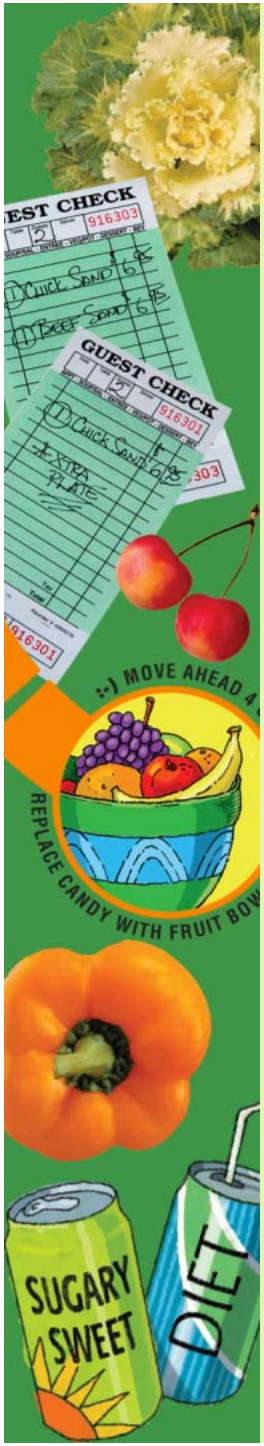
Mother's Name and Room # _____

Mother's Doctor _____

The longer your baby is breastfed, the greater the benefit.



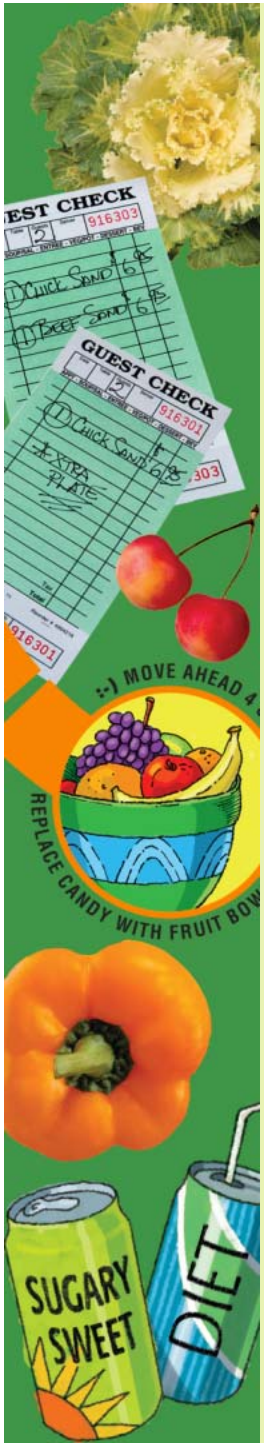
Research-to-practice Process



Staffing

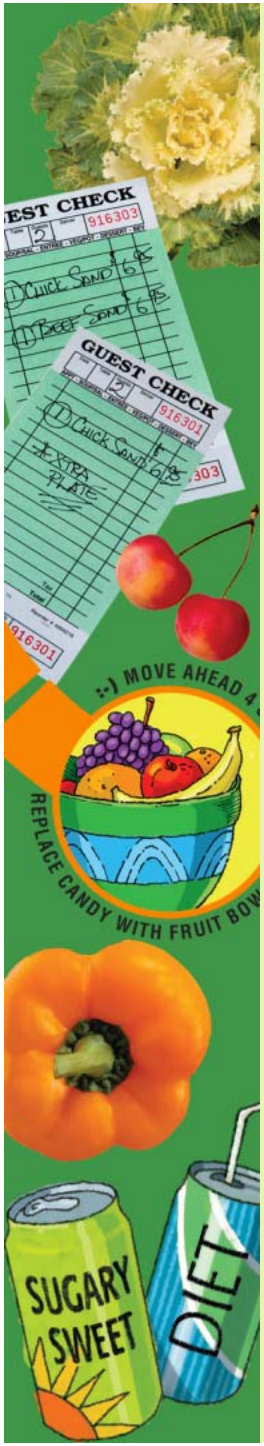
Multi-disciplinary workgroup

- Epidemiologists, public health nutritionists, behavioral scientists
- Health educators and communicators, graphic artists
- Associate Director for Science



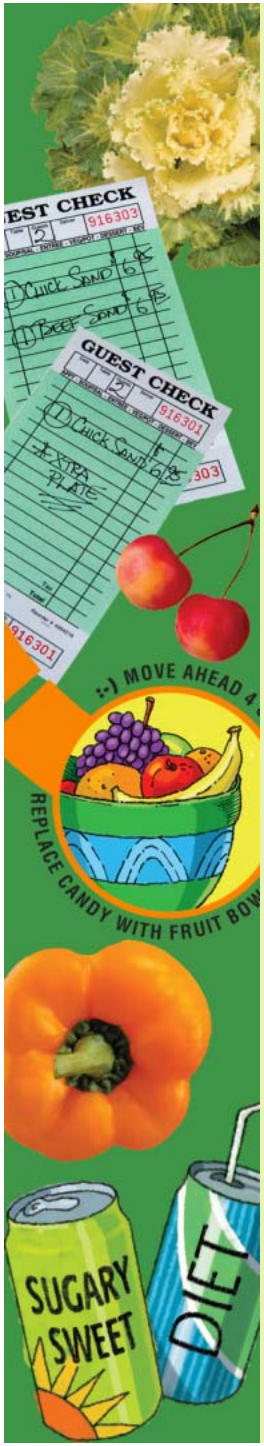
History

- First r2p products developed simultaneously by committee
- Streamlined process
  - Lead scientist writes summary report of the science and clears
  - Small team develops and tests practitioner brief, tool, and powerpoint slides
  - Entire group reviews products and comments by email



Strategic planning retreat (12/06)

- Vision for next 5 years
- SWOT analysis
- Audiences for the series
- Objectives for the series
- Next steps

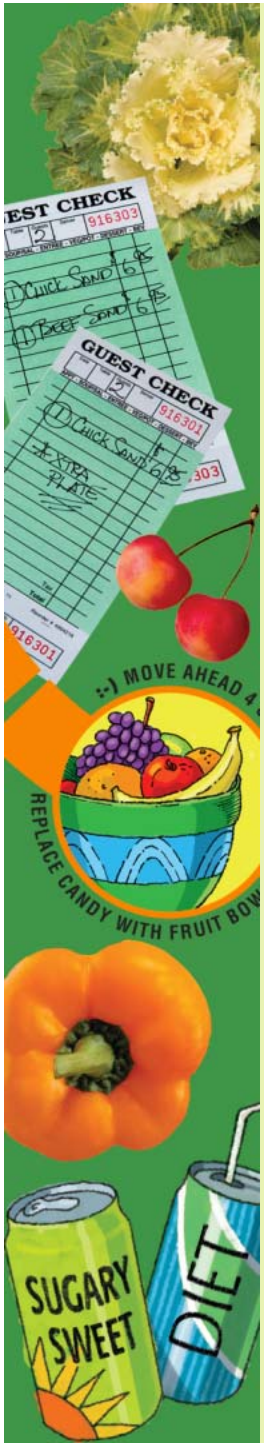


Decisions from Retreat

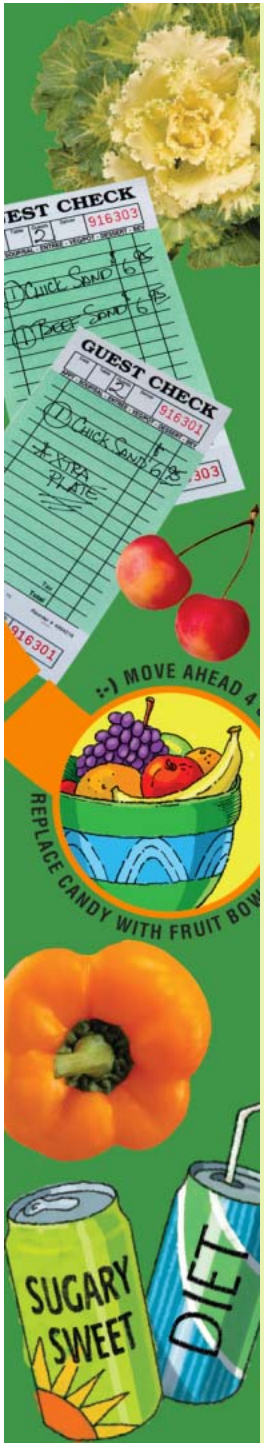
- Complete r2p's in process more effeciently
- Focus on DNPAO-funded states as primary audience
  - Rethink practitioner tool
- Develop:
  - Guidelines for different products
  - Dissemination plan
  - System for updating existing r2p's
- Conduct needs assessment and evaluate the series

Needs Assessment/Testing

- Reaction to series as a whole
  - What used and how
  - What worked, what didn't, suggestions
  - What else needed; does R2P fit the bill?
- Needs re practitioner tools
  - Reaction to existing tools
  - Open-ended question, then present some ideas
  - Powerpoint slides
- Testing of specific materials
  - Food Away from Home brief
  - Breastfeeding PP slides
  - TLC brief
- Dissemination channels

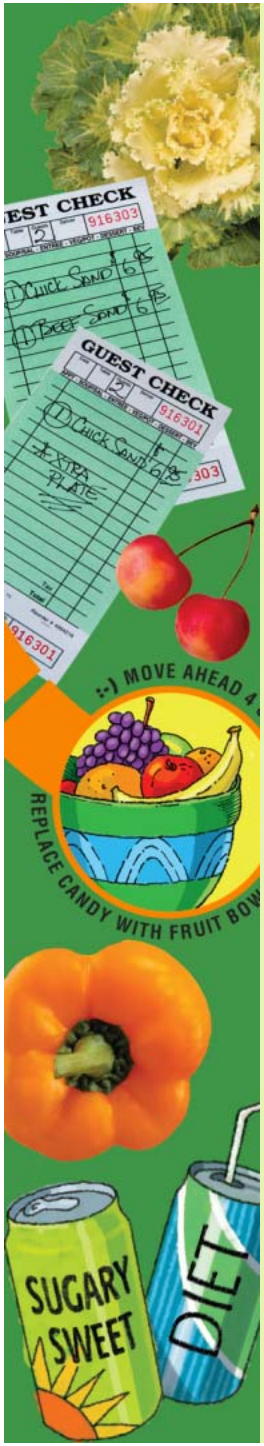


What have we learned?



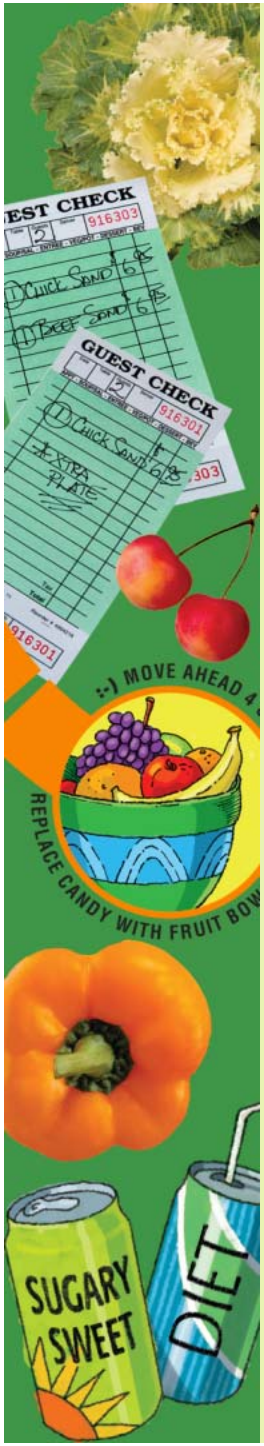
Lessons Learned – Group Process

- Agree upon audiences and objectives
- Define and assign clear roles
- Regular meetings with clear agenda
- Written progress chart on share drive
  - Topic
  - Current status
  - Responsible party
  - Next steps
- Develop guidelines



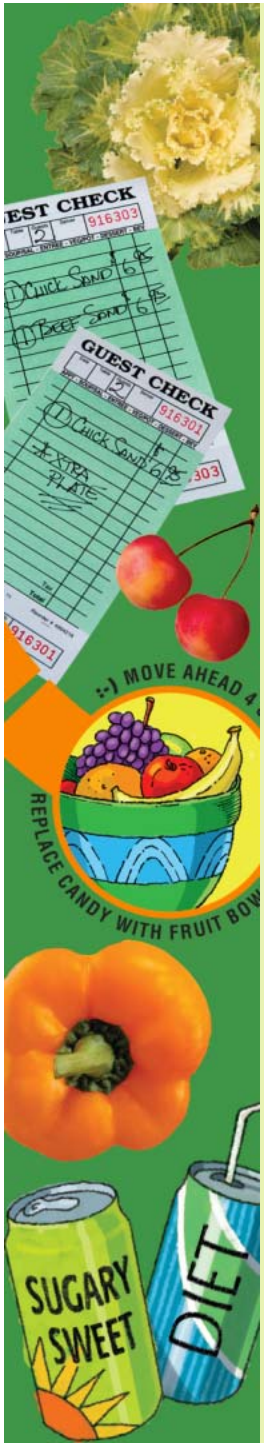
Lessons Learned – Developing Useful Products

- Get the science right first
- Identify people with appropriate expertise for each task
- Conduct formative research with audience(s)
- Pretest products with the audience
- Try to get them out faster!



Current Status

- Available now (see handout):
  - Fruits and vegetables and weight
  - Portion size
  - Sugar-sweetened beverages
  - Breastfeeding
- Almost done - Energy density
- Testing practitioner brief:
  - Food away from home
  - TLC diet
- Just started - Weight loss maintenance



Thank you