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Gobbling Up Snacks Cause or Potential Cure for Childhood Obesity?

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- Children today are consuming close to 200 more calories a day from snacks than they did in the 1970s.
- Replacing a calorie-dense snack food with a fruit or vegetable could reduce calorie intake and improve diet quality.
- Swapping common snack foods with a ½-cup serving of fruits or vegetables can be done without compromising a household's food budget.

Consumption of snacks among children has increased markedly over the last 35 years. In the late 1970s, American children consumed an average of only one snack a day. Today, they are consuming nearly three snacks per day. As a result, daily calories from children's snacks have increased by almost 200 calories over the period. Many of the snacks children consume are high-calorie, low-nutrient foods such as desserts and salty snacks. Trends in snacking, combined with larger portion sizes and more sedentary lifestyles, may be contributing to the incidence of overweight and obesity among children.

Despite its likely role in childhood obesity, snacking may provide a mechanism for addressing this obesity problem and improving diet quality. Replacing one energy-dense snack each day with a fruit or vegetable could reduce caloric intake and decrease the prevalence of overweight and obesity. For example, a child replacing 1 ounce of potato chips (150 calories) with a cup of grapes (104 calories) or a medium-sized apple (95 calories) would consume 46-55 fewer snack calories. If done on a daily basis, all else equal, this simple behavior could result in about half a pound less of body weight at the end of a month. And, replacing desserts or salty snack foods with fruits and vegetables has the added bonus of

reducing a child's intake of added fats and sugars. But is this likely to increase food costs? The reality is that replacing a snack with a fruit or vegetable need not break a household's food budget.

Are Fruits and Vegetables Really More Expensive?

Most Americans do not consume the recommended amount of fruits and vegetables. Researchers at Ohio State University found that in the early 2000s, 74 percent of children age 6-11 consumed less than the recommended amount of fruit and 84 percent consumed less than the recommended amount of vegetables. Tastes for sugary or salty foods, convenience, and the perception of fruits and vegetables as being expensive are among the reasons for this dietary disconnect.

The perception that fruits and vegetables--particularly in fresh form--are expensive is pervasive. In a 2012 survey for the Produce for Better Health Foundation, nearly two-thirds of mothers with children age 10 and younger cited cost as the most important factor when shopping for fruits and vegetables. The perceived high cost is of particular concern among lower income households.

A number of studies also claim that "healthy" foods like fruits and vegetables cost more than other foods. All such studies use price *per calorie* as the basis for comparison. However, ERS researchers demonstrated that any conclusions about what types of foods are considered expensive depend on the unit in which prices are measured. Fruits and vegetables appear to be more expensive than foods high in saturated fat, added sugars, and/or sodium when prices are measured by calories but not necessarily when prices are compared using other measures. For example, when using price per average amount consumed, the researchers found that fruits and vegetables are typically less expensive than less healthy foods.

In another study, ERS researchers estimated the cost of 59 fresh and processed fruits and 94 fresh and processed vegetables after adjusting for the removal of inedible parts and cooking losses. They found that Americans on a 2,000-calorie diet could purchase the quantity and variety of both fruits and vegetables recommended in the 2010 *Dietary Guidelines for Americans* for between \$2.00 and \$2.50 per day.

For most Americans, consuming the recommended quantity and variety of fruits and vegetables will require increasing their consumption of and spending on fruits and vegetables. However, the increase in spending is more a function of the shortfall between the amounts currently consumed and the amounts recommended by nutritionists than of the high cost of fruits and vegetables. Furthermore, increased spending on fruits and vegetables need not be associated with increased food spending overall but could be offset by reduced spending on other foods. Given that most Americans consume too many calories, good candidates for reduced spending include high-calorie, low-nutrient foods like the salty/sweet snacks increasingly favored by children.

Price Per Portion Captures Food Costs Better

What are some of the foods that a child might eat as a snack? For this analysis, 20 items were selected from among the salty snacks, baked and sweet goods, and frozen treats that children age 6-13 reported consuming in the 2005-08 National Health and Nutrition Examination Surveys (NHANES). In these surveys, participants report the types and quantities of foods that they eat over 2 nonconsecutive days. Each of the snack foods selected for analysis was commonly consumed, requires little or no preparation, and is available in grocery stores and other food retailers. Most also turned out to be high in calories, added sugars, fat, and/or sodium and are considered less healthy relative to fruits and vegetables.

Twenty fruits and vegetables in both fresh and processed forms were identified as potential replacements for snack foods. Some of these items, such as fresh apples and bananas, are already commonly consumed by children. Others are not. This may explain why, for 12 of the 20 fruits and vegetables, children who reported consuming these foods ate, on average, less than ½ cup-equivalent. (A cup-equivalent is generally the amount of edible food needed to fill a 1-cup measuring cup; 2 cups for raw leafy greens, ½ cup for dried fruit.) One-half of a cup-equivalent is similar to what the 2010 *Dietary Guidelines for Americans* define as a "serving" and is also similar to the size of many fruit cups sold in supermarkets for snacks and lunch boxes.

It was particularly difficult to find vegetable options, as children tend to consume most vegetables infrequently and in small amounts, so completing the list of fruit and

Twenty commonly consumed snack foods and 20 potential fruit and vegetable substitutes underlie this analysis

Snack food	Portion size, oz ¹	Calories per portion	Fruits and vegetables	Portion size oz ¹	Calories per portion
Chocolate candy	0.9	262	Apples	5.2	77
Cookies	1.0	123	Applesauce	4.6	100
Corn chips	1.0	140	Bananas	4.1	102
Crackers	0.9	114	Cantaloupe	3.5	33
Cupcakes	2.0	174	Fruit cocktail, canned*	4.4 (3.9)	71
Danish	2.6	271	Grapes	3.0	59
Donuts	2.1	235	Oranges, navel	3.8	53
Fruit rolls	0.8	82	Peaches, canned*	4.4 (3.8)	68
Graham crackers	0.9	102	Pineapple, canned*	4.4 (3.4)	75
Granola bars	1.1	119	Plums*	2.9 (2.3)	38
Ice cream	3.8	196	Raisins*	1.3 (0.9)	109
Muffins	3.3	369	Strawberries*	2.9 (2.3)	27
Pizza, frozen	3.3	252	Tangerines	4.8	72
Popsicles and bars	1 count	80	Watermelon	8.7	74
Potato chips	1.1	169	Broccoli florets, raw*	1.6 (1.1)	12
Pretzels	1.5	168	Carrots, baby*	2.3 (1.4)	22
Pudding	4.1	152	Celery*	2.1 (0.6)	10
Sandwich crackers	1.3	183	Red peppers*	2.6 (0.1)	23
Toaster pastries	2.7	299	Sweet potatoes, cooked*	3.5 (0.5)	90
Tortilla chips	1.2	161	Tomatoes, grape*	3.2 (1.5)	16

¹Average amount consumed by children age 6-13 who reported consuming the food. For fruits and vegetables, portion size is the larger of the average amount consumed or ½ cup-equivalent.

*Portion size is ½ cup-equivalent. (Numbers in parentheses are the average amount consumed.)

Source: USDA, Economic Research Service using data from the 2005-08 National Health and Nutrition Examination Survey (NHANES) for portion sizes and USDA's National Nutrient Database for Standard Reference, Release 24 for calories per portion.

vegetable snacks required creative thinking. For example, sweet potatoes--although not commonly consumed by children--are easy to microwave and might appeal to children because of their sweet taste.

Retail prices for the 40 snacks vary widely. Household scanner data reveal that, in 2010, Americans paid \$0.24 per pound for whole watermelon, \$1.11 per pound for canned peaches, and \$3.86 per pound for potato chips (see box, "Estimating the Costs of Buying and Eating Foods"). Retail price per pound, however, is a misleading measure for assessing the impact on a household's food budget of replacing

a snack food with a fruit or vegetable. First, consumers purchase and eat different amounts of various food items. Second, foods vary in their amounts of inedible parts, and some foods may gain or lose weight upon cooking. A 16-ounce bag of potato chips, for example, might provide 16 snack portions, whereas a pound of watermelon might provide 3 to 4 snack portions after removing the inedible rind. Therefore, price per portion is a better indicator of food costs.

In this analysis, a portion equals the average amount consumed per eating occasion by children age 6-13 in

Estimating the Costs of Buying and Eating Foods

Retail food prices are easily checked by most any consumer walking through the aisles of a store. Less observable is the cost of actually consuming a given food. ERS researchers studying food costs draw on various data sources to estimate average purchase prices as well as the cost of consuming specific foods.

A key source of data on retail food prices is scanner data. Nielsen Homescan data are one such source. Households participating in the Homescan consumer panel use a scanner at home to record items purchased, quantities bought, amount of money paid, and date of purchase for all retail food purchases. The 2010 data provide limited information about random-weight foods such as loose apples and store-baked muffins. Thus, purchase information is only available for foods such as prepackaged apples and muffins that are sold with a Universal Product Code (UPC), a type of bar code. The 2010 Homescan data used for this analysis is based on information from 60,648 households.

National average retail prices were calculated for this analysis by summing expenditures for each snack across all brands, flavors, and package sizes of the snack, across all stores, and over an entire year, and dividing by quantities purchased. The price of “muffins,” for example, includes small, medium, and large blueberry, cranberry, bran, and other sizes and flavors of muffins sold with a UPC. This approach gives a greater weight to the prices of more frequently purchased flavors and sizes.

Some retail food products like potato chips and muffins can be eaten “as is,” while others require the consumer to remove inedible parts or cook the food prior to consumption. A food’s edible and retail weights are different in these cases. For example, in 2005-08, children consumed an average 5.2 edible ounces of apples. However, since 10 percent of a fresh apple is inedible, households must buy 5.8 ounces of apples at retail in order to consume 5.2 ounces. Multiplying 5.8 ounces by the average retail cost for apples (\$0.99 per pound in 2010) reveals the estimated cost of eating an average portion of apples to be \$0.36.

the 2005-08 NHANES. For the 12 fruits and vegetables currently consumed by children in small quantities, the portion size was set at one-half of a cup-equivalent, assuming children would need to replace current snacks with a “reasonable” amount of a fruit or vegetable. In converting each food’s retail price to a price per portion, adjustments were made for refuse (i.e., the watermelon rind or the peel of a banana) and for weight lost or gained when cooking (e.g., when microwaving a sweet potato).

Food Budgets Not Affected by Swapping Snacks

Contrary to popular perception, fruits and vegetables are comparable in price per portion to other snack foods, and both groups offer inexpensive as well as more expensive options. Nine of the 20 fruits and vegetables and 8 of the 20 other snack foods cost 25 cents per portion or less; an additional 8 fruits and vegetables and 10 other snack foods cost between 26 and 50 cents per portion. On average, the 20 fruits and vegetables cost 31 cents per portion, while the 20 other snack foods cost 33 cents per portion. Graham crackers were the least expensive of the 40 snacks examined (14 cents per portion), and muffins and frozen pizza were the two most expensive (83 and 63 cents per portion).

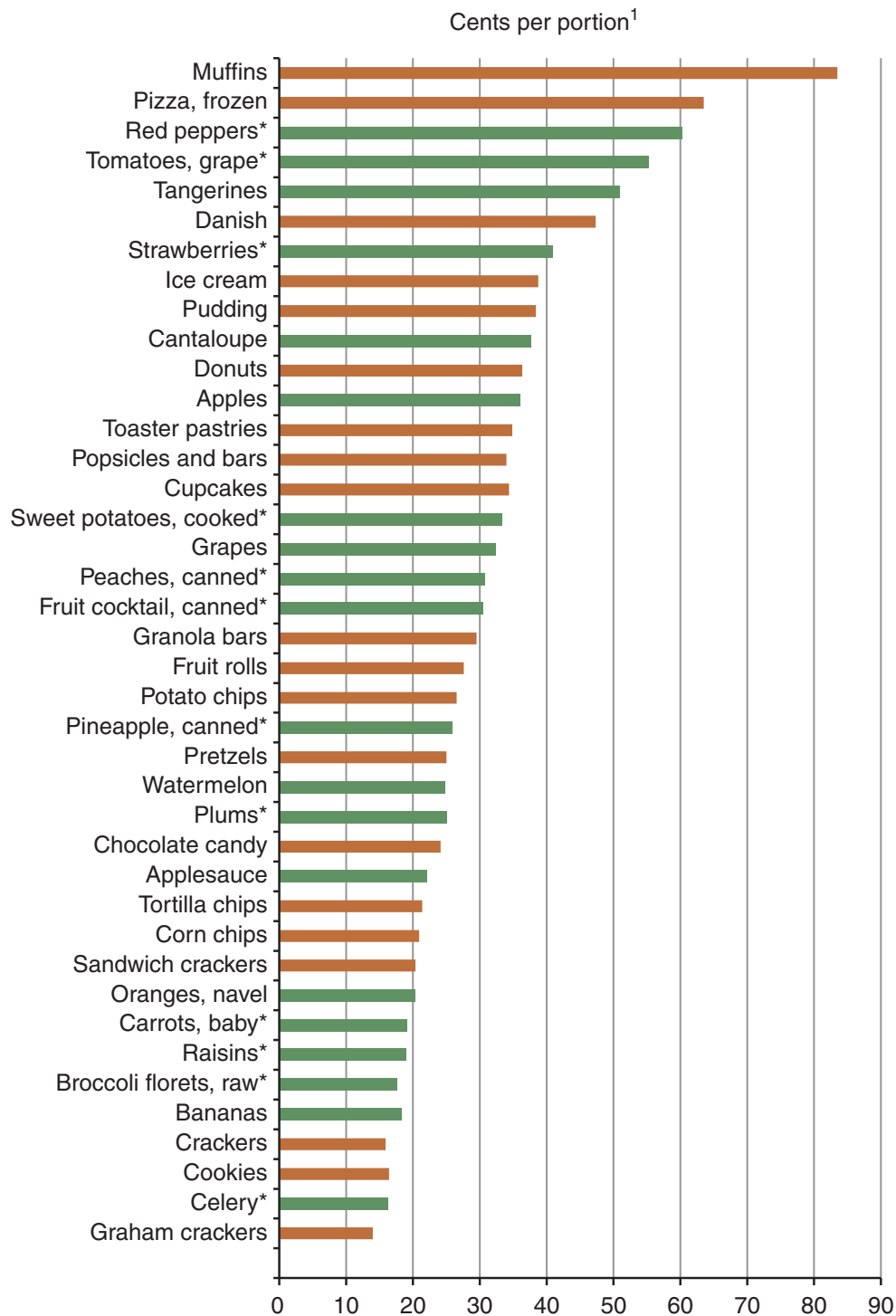
Although some substitutions can increase food costs, others can reduce or have no impact on the food budget. Most substitutions, however, reduce snack calories. For example, replacing:

- a 1-ounce chocolate chip cookie with $\frac{1}{4}$ cup of dried raisins saves 14 calories and costs an additional 3 cents;
- 4.1 ounces of ready-to-eat pudding with $\frac{1}{2}$ cup of baby carrots saves 130 calories and 19 cents;
- 1.1 ounces of potato chips with $\frac{1}{2}$ cup of strawberries saves 142 calories and costs an additional 14 cents.

Making these 3 substitutions could reduce caloric intake by 286 calories with little change in cost (2 cents savings), as higher costs for some substitutions are offset by lower costs for others.

Another 397 substitutions are possible using each of the 20 fruits and vegetables to replace each of the 20 snack foods, with different calorie and cost tradeoffs. Making all 400 substitutions would result in an overall reduction

Many fruits and vegetables cost about the same, per portion, as snack foods



¹Average amount consumed by children age 6-13 who reported consuming the food in the 2005-08 National Health and Nutrition Examination Survey (NHANES). For fruits and vegetables, portion size is the larger of the average amount consumed or ½ cup-equivalent. Fruits and vegetables with an asterisk are those for which a portion is ½ cup-equivalent. For popsicles and bars, a portion is 1 count.

Source: USDA, Economic Research Service.

of \$7.00 in food costs--a small amount when spread over the 13 or so months needed to make all 400 substitutions at a rate of 1 substitution a day. The net impact on calories, however, is considerable, averaging 126 fewer calories per substitution. A month of swapping snacks once a day would save 3,780 calories, which, all else equal, would translate into approximately 1 less pound of body weight.

Substituting a fruit or vegetable for another type of snack food could increase fruit and vegetable consumption and help reduce childhood obesity. The Produce for Better Health Foundation reports that most mothers are aware that their families do not consume enough fruits and vegetables and are interested in new ways to incorporate these foods into their children's diets.

The perception that fruits and vegetables are expensive may be a barrier to replacing fruits and vegetables for other snack foods. But the reality is that many fruits and vegetables are no more expensive per portion than many popular snack foods. For any given household, the actual impact on both calories and food costs will depend on the snack foods consumed by children, the fruits and vegetables

used as replacements, the amounts consumed, and prices paid for each food. The results of this analysis, however, show that replacing less healthy snack foods with fruits and vegetables does not have to compromise a household's food budget.

This article is drawn from...

Are Healthy Foods Really More Expensive? It Depends on How You Measure the Price, by Andrea Carlson and Elizabeth Frazão, EIB-96, USDA, Economic Research Service, May 2012, available at: www.ers.usda.gov/publications/eib-economic-information-bulletin/eib96.aspx

How Much Do Fruits and Vegetables Cost? by Hayden Stewart, Jeffrey Hyman, Jean C. Buzby, Elizabeth Frazão, and Andrea Carlson, EIB-71, USDA, Economic Research Service, 2011, available at: www.ers.usda.gov/publications/eib-economic-information-bulletin/eib71.aspx

"Can Low-Income Americans Afford To Satisfy MyPyramid Fruit and Vegetable Guidelines?" by Hayden Stewart, Jeffrey Hyman, Elizabeth Frazão, Jean C. Buzby, and Andrea Carlson, in *Journal of Nutrition Education and Behavior*, Vol. 43, No. 3, May 2011, pp. 173-179.

"A Wide Variety of Fruit and Vegetables Are Affordable for SNAP Recipients," by Hayden Stewart and Andrea Carlson, in *Amber Waves*, December 2011, available at: www.ers.usda.gov/amber-waves/2011-december/a-wide-variety-of-fruit-and-vegetables.aspx

ERS Data on Fruit and Vegetable Prices, available at: www.ers.usda.gov/data-products/fruit-and-vegetable-prices.aspx