

Markets and Childhood Obesity Policy

John Cawley

Summary

In examining the childhood obesity epidemic from the perspective of economics, John Cawley looks at both possible causes and possible policy solutions that work through markets. The operation of markets, says Cawley, has contributed to the recent increase in childhood overweight in three main ways. First, the real price of food fell. In particular, energy-dense foods, such as those containing fats and sugars, became relatively cheaper than less energy-dense foods, such as fresh fruits and vegetables. Second, rising wages increased the “opportunity costs” of food preparation for college graduates, encouraging them to spend less time preparing meals. Third, technological changes created incentives to use prepackaged food rather than to prepare foods.

Several economic rationales justify government intervention in markets to address these problems. First, because free markets generally under-provide information, the government may intervene to provide consumers with nutrition information they need. Second, because society bears the soaring costs of obesity, the government may intervene to lower the costs to taxpayers. Third, because children are not what economists call “rational consumers”—they cannot evaluate information critically and weigh the future consequences of their actions—the government may step in to help them make better choices.

The government can easily disseminate information to consumers directly, but formulating policies to address the other two rationales is more difficult. In the absence of ideal policies to combat obesity, the government must turn to “second-best” policies. For example, it could protect children from advertisements for “junk food.” It could implement taxes and subsidies that discourage the consumption of unhealthful foods or encourage physical activity. It could require schools to remove vending machines for soda and candy.

From the economic perspective, policymakers should evaluate these options on the basis of cost-effectiveness studies. Researchers, however, have as yet undertaken few such studies of obesity-related policy options. Such analyses, once available, will help policymakers achieve the greatest benefit from a fixed budget.

www.futureofchildren.org

John Cawley is an associate professor of policy analysis and management at Cornell University. The author thanks Elizabeth Donahue, J. A. Grisso, Barrett Kirwan, Philip Levine, Laura Leviton, Alan Mathios, Tracy Orleans, Christina Paxson, the Robert Wood Johnson Foundation working group on childhood obesity, and participants at the Future of Children conference on Childhood Obesity for their helpful comments and suggestions.

Since the early 1970s, the prevalence of overweight has more than doubled among children aged two to five, almost quadrupled for children aged six to eleven, and more than doubled among adolescents aged twelve to nineteen.¹ During 1999–2000, the prevalence of overweight was 11.6 percent among toddlers aged six months to twenty-three months, 10.4 percent among children aged two to five years, 15.3 percent among children aged six to eleven, and 15.5 percent among adolescents. The health risks associated with childhood obesity, including asthma, hypertension, type 2 diabetes, cardiovascular disease, and depression, have led medical authorities to declare the rise in childhood obesity a public health crisis.²

The epidemic of childhood obesity has many causes—cultural, economic, and genetic.³ In this article, I focus on the causes and possible policy solutions that work through markets. I use economics to weigh and assess the evidence.⁴

How Markets May Have Contributed to the Rise in Childhood Overweight

Several strands of research investigate how markets may contribute to increased calorie consumption, sedentary lifestyles, or overweight and how changes in those markets may have contributed to the recent rise in childhood overweight. The problem for researchers is not figuring out what could have caused the rise in childhood obesity; the problem is that too many things could have caused it. James Hill and several colleagues calculate that the rise in obesity in the United States could have been caused by a daily surplus of just 15 calories for the median person, with 90 percent of the population increasing their intake by 50 or fewer calories a day.⁵ To put this

in perspective, the rise in weight for the median person could have been caused by consuming an extra three tablespoons of skim milk or walking 120 fewer yards each day. It will likely be impossible to determine which changes are responsible for such a small increase in daily calorie surplus, but I will consider several possible contributors.

Changes in the Cost of Food and Food Preparation

The most obvious contributor to the increasing calorie surplus is falling food prices. Between January 1980 and January 2005, the real price of food fell 13 percent.⁶ One study attributes 40 percent of the recent rise in weight to lower food prices.⁷

Changes in the “opportunity cost” of time spent cooking may also have affected eating patterns. Strictly speaking, the opportunity cost of a person’s time is the value of that time devoted to the next best available alternative, but in practice it is often measured by the wage rate. All else being equal, if someone’s wage rate rises, he or she will likely spend less time cooking and will instead use prepackaged foods that require less preparation time or will eat food prepared by others, such as restaurant meals or “takeout.” It is also possible that he or she would simply consume less food as a result of spending less time cooking.

How much wages have changed over the past twenty-five to thirty years varies by the wage earners’ educational attainment. Real wages for high school dropouts have fallen, those for high school graduates have remained roughly constant, and those for college graduates have risen considerably.⁸ These wage dynamics imply that the time cost of cooking rose for college graduates and fell for high school dropouts. To my knowledge, data on time spent cooking have not been sorted by

education, but for the U.S. population as a whole, the number of minutes spent each day preparing meals fell from forty-four in 1965 to thirty-two in 1999.⁹

While changing wage rates affected the opportunity cost of time spent cooking, technological change may have reduced the time required to prepare some foods. David Cutler, Edward Glaeser, and Jesse Shapiro argue that innovations in food processing, preservation, and packaging made it possible for food to be mass prepared far from the place of consumption and to be consumed with less time cost. These innovations contributed to a shift away from home-cooked meals toward processed food, thus increasing obesity. In support of their argument, the researchers show that consumption of mass-produced foods increased the most, that people most able to take advantage of these technological changes had the greatest increases in weight, and that obesity is greatest in countries where people have the greatest access to processed food.¹⁰

Changes in the share of women who work also affected time spent cooking. Over the past three decades, the labor force participation rate of women with children younger than age eighteen rose from 47 to 72 percent, with the largest increase among mothers with children younger than age three.¹¹ The increased work time may have resulted in the increased use of prepackaged foods or of food consumed away from home. One study calculates that during the past three decades the increase in mothers' average weekly hours at work explains 12 to 35 percent of the increase in childhood obesity in families of high socioeconomic status.¹²

During this same period Congress reformed the nation's welfare system, in the process

giving poor single mothers an economic incentive to spend less time cooking. With some exceptions, the 1996 welfare reform law required single mothers to work in the labor force to receive cash welfare benefits.¹³ Thus even though falling real wages lowered the opportunity cost of cooking for high school dropouts, poor single mothers had

For the U.S. population as a whole, the number of minutes spent each day preparing meals fell from forty-four in 1965 to thirty-two in 1999.

good reason to spend more time in the labor force and less time in household production.

To better establish the link among changing costs of time, time spent cooking, eating out, and childhood obesity, researchers must answer several questions. First, they must find out how different groups of people responded to the changing costs of time. For example, do college graduates and welfare-eligible women spend less time cooking and high school dropouts spend more time cooking? Second, they must determine whether changes in cooking time led college graduates and welfare-eligible women to use more prepackaged foods or restaurant food and led high school dropouts to use less. And, third, they must prove the link between the consumption of prepackaged and restaurant foods and childhood obesity.

Another possible contributor to obesity is the price of energy-dense foods, such as those containing fats and sugars, relative to that of

less energy-dense foods, such as fresh fruits and vegetables. Adam Drewnowski and S. E. Specter calculate that, on a per-calorie basis, energy-dense foods are cheap whereas foods low in energy density are much more expensive.¹⁴ However, a Department of Agriculture (USDA) study suggests that less energy-dense foods can still be quite cheap in

Between 1977 and 1995, the share of total calories consumed away from home rose from 18 to 34 percent, the share of meals consumed away from home rose from 16 to 29 percent, and the total share of food dollars spent away from home rose from 26 to 39 percent.

absolute terms; it calculates that a person can satisfy the USDA's recommendation of three daily servings of fruit and four servings of vegetables for just 64 cents a day. The study also concludes that 63 percent of fruits and 57 percent of vegetables were cheapest in their fresh form.¹⁵

Further research must determine whether the relative price of energy-dense foods has fallen in the past several decades. A quick comparison of the various consumer price indexes indicates that between January 1989 and January 2005, the real price of fruits and vegetables rose 74.6 percent while that of fats and oils fell 26.5 percent and that of sugars and sweets fell 33.1 percent. Thus energy-

dense foods have become considerably cheaper, relative to less energy-dense foods, in the past fifteen years.¹⁶

Changes in Where Americans Eat Their Meals

Perhaps because of the increasing opportunity cost of time for college graduates or the movement of women into the labor force, Americans are eating more meals away from home today than they did thirty years ago. Between 1977 and 1995, the share of total calories consumed away from home rose from 18 to 34 percent, the share of meals consumed away from home rose from 16 to 29 percent, and the total share of food dollars spent away from home rose from 26 to 39 percent.¹⁷ From 1994 through 1996, children consumed 32 percent of all their calories away from home: 10 percent in fast-food restaurants, 9 percent in schools, 4 percent in restaurants, and 9 percent from all other sources, such as vending machines and other people's houses.¹⁸

The move toward food away from home came just as this food itself (not the time costs of preparing it) was becoming more expensive relative to food at home. Between January 1980 and January 2005, the real price of food at home fell 16.2 percent while the real price of food away from home fell only 5.1 percent.¹⁹ Eating out became more common even as it was becoming relatively more expensive.

The distinction between food at home and food away from home is important because consumers typically have less information about the calorie content of foods they eat away from home. Relative to food at home, food away from home has on average lower fiber and calcium density, similar sodium density, and higher cholesterol density.²⁰ Nutritional trends both for food at home and for

food away from home are promising: in both, the densities of fat, saturated fat, and cholesterol have declined, and the density of fiber has increased slightly, though away-from-home foods have improved less than food at home.²¹ Further research must explore whether the move toward consuming more food away from home and eating less at home has caused an increase in childhood obesity.

Changes in Portion Sizes

Portion sizes of certain foods have increased since the 1970s. One study of portion sizes looks at package labels and manufacturers' information and concludes that the portion sizes of "virtually all" the packaged foods and beverages it examines have increased during the past three decades.²² Such a finding is important because several experiments have documented that when people are served larger portions, they consume more calories.²³ The portion size effect is first detectable in children five years old.²⁴

The increase in portion sizes, combined with people's tendency to eat more when served larger portions, implies that the amount of food consumed at one sitting has increased. Smiciklas-Wright and her colleagues use the Continuing Survey of Food Intakes by Individuals to study the quantities consumed at one sitting and find significant increases for about a third of the 107 foods they examine. The study does not specify whether these items were ones packed in larger portions by manufacturers. They find significant decreases in amounts consumed for six other foods.²⁵

One limit of the research on portion sizes and calorie intake is that the increases in portion sizes in experiments do not match the increased portion sizes in the market. For example, some studies experimentally increased portions of macaroni and cheese, but

the Smiciklas-Wright team found that the portions of macaroni and cheese that people reported consuming fell 17 percent between 1989–91 and 1994–96.

Whether people eat more when they are notified of the increase in portion size is unclear. In the market, some food manufacturers take pains to emphasize the increased size of their products—for example, the Big Gulp, Monster Thickburger, and "super-sized" meals. Moreover, the increases in calorie consumption documented in these experiments (30 to 50 percent) are far larger than the small increase in daily calorie surplus that caused the rise in obesity. Because these experiments typically last no longer than a few meals or days, it is also unclear whether in the longer run people adapt to the larger portion sizes and return to consuming their normal amount. For example, suppose every day were Thanksgiving. You might eat large portions the first day, but you probably would not continue to eat "Thanksgiving-sized" meals every day. At some point you might return to your previous level of caloric consumption. Longer-term research is needed to determine the long-run effect of portion size, as well as what the effect is when consumers are notified of the larger portions.

Changes in Farm Policies

Agriculture policy may contribute to obesity by promoting lower prices and greater production of certain commodities. From 1933 to 1995, price supports kept the prices of wheat, corn, soybeans, oats, and other commodities above their free-market prices in the United States; the government purchased excess supplies to bolster prices. The 1995 Farm Bill, however, reformed the system. Rather than subsidizing farmers by keeping prices artificially high, the government now gives farmers a production subsidy, or a payment based on

their historic production. In other words, the new law completely decoupled subsidies to farmers from production, and consumers switched from paying above-market to below-market prices for agricultural commodities.²⁶

Trade policies still keep some commodities' prices high. A system of quotas and tariffs, for example, keeps the U.S. price of sugar above the world price.²⁷ Agriculture policy has lowered the prices of other sweeteners,

A system of quotas and tariffs keeps the U.S. price of sugar above the world price, while agriculture policy has lowered the prices of other sweeteners.

however. In particular, farm policy has been criticized for subsidizing the production of corn and, thereby, of high-fructose corn syrup, which is now common in soft drinks, fruit juices, jelly, and other foods.²⁸

The USDA estimates that production subsidies increased the land under cultivation by 4 million acres and lowered the price of wheat by seven cents a bushel, of corn by nine cents a bushel, and of soybeans by forty-nine cents a bushel.²⁹ A second study figures that direct payments to farmers boost agricultural output 4.39 percent.³⁰ And a third calculates that policy changes in the 1995 Farm Bill and thereafter increased production of grains and soybeans 4 percent and lowered prices 5 to 8 percent.³¹ Of course, consumers do not buy and consume bushels of wheat and soybeans directly; instead, they eat food manufactured from these crops. One study estimates that for every 1 percent decrease in commodity

prices, food prices decline 0.25 percent.³² Another study determines that agricultural subsidies explain about 1 percent of the increase in obesity over the past two decades.³³

When price supports were still a mainstay of U.S. farm policy, Washington established "checkoff" programs to increase demand for covered commodities, thereby lessening the excess supply that it was obliged to purchase. The checkoff programs required producers to contribute a fixed amount per commodity unit sold to a nonprofit organization that used the money to increase consumer demand for that commodity by researching new uses for it and advertising those uses to consumers. Commodity checkoff programs, which have persisted even after price supports were removed, now spend \$1 billion a year to increase demand for their products.³⁴

Substantial checkoff resources go for advertising, and they have a considerable impact. Checkoff-funded advertising campaigns include "Ahh, the Power of Cheese," "Beef—It's What's for Dinner," "Pork—the Other White Meat," and "Got Milk?" Noel Blisard estimates that the generic advertising of milk totaled \$29.8 million between October 1995 and September 1996, raising milk sales by 1.4 billion pounds, or 5.9 percent, while generic advertising of cheese funded by checkoff programs increased sales of cheese by 62.7 million pounds, or 2.8 percent.³⁵ Although advertising funded by checkoff dollars increases consumer demand, collecting checkoff funds from producers is a form of tax, which raises producers' costs and lowers the quantities sold. On net, however, the checkoff programs increase commodities' sales.³⁶

Whether checkoff-funded advertising encourages consumers to spend more money overall on food or simply redirects their fixed food

budget to the advertised products is unclear. Brenda Boetel and Donald Liu find that beef and pork advertising is “beggar thy neighbor” in the sense that beef advertising decreases the demand for pork and vice versa. They conclude that beef and pork producers would be better off if they agreed to reduce their generic checkoff-funded advertising campaigns.³⁷ Checkoff funds are also used to increase commodities’ sales by developing new menu items for fast-food restaurants, such as the McRib pork sandwich for McDonald’s and Insider Pizza (which used one pound of cheese per medium pizza) for Pizza Hut.³⁸

Although analysts have linked various farm policies to the increased sales of certain crops and to the development of menu items for fast-food restaurants, documenting the effect these programs have on obesity itself requires more research.

Increased Food Advertising to Children

The food industry spent \$7 billion on advertising in 1997, more than any other industry except automobiles. Two-thirds of that advertising was by food manufacturers, 28 percent by the food service industry (mostly fast-food restaurants), and 8 percent by food stores.³⁹ It is estimated that the number of television commercials viewed each year by the average American child doubled from about 20,000 in 1970 to 40,000 around the year 2000.⁴⁰ But although children are viewing more commercials, the length of the average commercial has fallen.⁴¹ In addition, Roland Sturm finds that the average time children spent watching TV fell 23 percent, or four hours a week, between 1981 and 1997.⁴²

One study, which analyzes the food advertisements aired during children’s Saturday morning television programming, concludes that if a child consumed only the advertised food,

his diet would not be consistent with U.S. dietary recommendations.⁴³ Gerard Hastings and several colleagues conclude that over time advertisements for fruits and vegetables have disappeared and have been replaced by ads for fast-food restaurants, breakfast cereals, soft drinks, and snacks.⁴⁴

Two broad reviews of the experimental research on food advertising and youth diets conclude that there is very mixed evidence on whether television advertising causally affects children’s diets.⁴⁵

Because of several limitations of this research, including the use of small, nonrepresentative samples, making it difficult to draw inferences about larger populations from their findings, the American Academy of Pediatrics and the Institute of Medicine have called for more research on whether food advertising affects the diets of American youth.⁴⁶

Differences in Local Availability of Food and Exercise Opportunities

The prevalence of childhood obesity shows clear racial disparities. In 1998, 21.5 percent of African American children and 21.8 percent of Hispanic children but only 12.3 percent of white children were overweight.⁴⁷

Whether there are also economic disparities in the prevalence of childhood obesity within race and ethnic groups is less clear. R. P. Troiano and K. M. Flegal find no significant correlation between income and childhood obesity for African Americans or Hispanics. They find weak evidence that higher-income white adolescents are less likely to be obese, but they warn this evidence must be interpreted cautiously because of small sample sizes.⁴⁸

Some researchers have argued that racial and socioeconomic disparities in weight may be

due in part to differences in the availability of food and exercise opportunities. One study finds that supermarkets are three times more common in census tracts with home values in the highest quintile than in tracts with homes in the lowest quintile and four times more common in predominantly white than in predominantly black neighborhoods.⁴⁹ Conversely, smaller grocery stores and convenience stores without gas stations are more common in lower-wealth and predominantly black neighborhoods. Another study finds that the probability of at least one supermarket located in an urban zip code is higher where income is high and the poverty rate is low. But it finds no link between that probability and the share of residents who had graduated from high school.⁵⁰

Some researchers argue that these disparities are related to obesity because the proximity of such businesses is correlated with diet quality. Kimberly Morland, Steve Wing, and Ana Roux compare food consumption reported in questionnaires to food outlet availability in the census tract of residence and find that blacks living in census tracts with supermarkets are more likely to meet U.S. Dietary Guidelines for fruits and vegetables, total fat, and saturated fat. Findings for whites were generally not statistically significant.⁵¹

Joel Waldfogel finds that the population's educational and racial composition is correlated with restaurant density. Controlling for population size within a zip code (which may itself be correlated with both restaurant density and the educational and racial composition in an area), when the share of blacks and Hispanics is higher, there are fewer sit-down restaurants but more of certain fast-food restaurants.⁵²

Analysts find similar patterns for active recreational facilities, such as public beaches,

pools, youth centers, parks, YMCAs and YWCAs, dance studios, and athletic clubs. Penny Gordon-Larsen and several colleagues find that all major categories of such facilities are inequitably distributed across census block groups by socioeconomic status, minority population, and education. They find that the presence of just one such facility per census block group is associated with a 5 percent lower probability of overweight.⁵³

These studies are observational, not based on randomized experiments, and thus include an unknown degree of what researchers term "selection bias." Supermarkets and health clubs may open outlets in places where people are most interested in them—where they can earn the highest profits—and not in areas with low demand. Likewise, when people choose where to live, they may consider the retail options available nearby. People who cook meals from scratch may find it more attractive to live near a full-service supermarket, and exercise buffs may want to live near parks and gyms. Because of such self-selection, correlations between diet and supermarket proximity and between physical activity and proximity to athletic facilities may arise even without a causal relationship. For this reason, these research findings cannot be interpreted as causal or evidence of discrimination.

A related research area claims that new suburbs and developments contribute to obesity because they lack sidewalks and places to which people could walk or because they require long commutes.⁵⁴ But children's physical activity appears uncorrelated with such neighborhood characteristics as the availability of local facilities and safety.⁵⁵

Decreased Smoking

Over the same period that the prevalence of obesity has been on the rise, the prevalence

of adult smoking has fallen—from 33.2 percent in 1980 to 21.6 percent in 2003.⁵⁶ The share of high school students who smoke has also declined, from 27.5 percent in 1991 to 21.9 percent in 2003.⁵⁷ The trends in smoking and obesity may be related. A surgeon general's report reviewed fifteen medical studies and found that between 58 percent and 87 percent of those who quit smoking gained, on average, four pounds.⁵⁸ One study finds adults' weight is positively correlated with the local price of cigarettes (the higher the price, the higher the weight); the correlation with weight is roughly the same as that of grocery prices. The study finds no correlation of weight with clean indoor air laws that restrict smoking.⁵⁹ A second study, however, faults the first for not taking into account time trends in smoking and for focusing on cigarette prices instead of cigarette taxes; after making the necessary corrections, that study finds that higher cigarette taxes are associated with *lower* weight.⁶⁰

Economic Rationales for Market Intervention

If the government is to intervene in a market to reduce obesity, it should have an economic rationale to do so. Several such rationales exist. First, in free markets producers generally under-provide information. Governments can easily disseminate this information to help consumers make informed choices. The Nutrition Labeling and Education Act (NLEA) of 1990 requires producers to print nutrition labels on packaged foods, but no law requires the release of nutritional information for restaurant food or fountain drinks.

The second economic rationale for government intervention is that the costs of obesity are borne broadly by society. A 2003 study estimates that through Medicare and Medicaid, the government's medical care programs for

the elderly and the indigent, taxpayers pay half the total costs of treating obesity-related illnesses—costs that in 1998 amounted to \$92.6 billion (in 2002 dollars).⁶¹ The government may seek to reduce obesity to lower these costs to taxpayers.

The third economic rationale for intervention, which applies specifically to childhood obesity, is that children are not what econo-

Over the same period that the prevalence of obesity has been on the rise, the prevalence of adult smoking has fallen—from 33.2 percent in 1980 to 21.6 percent in 2003.

mists call “rational consumers.” They cannot evaluate information critically and weigh the future consequences of their actions. For much the same reason that the government bans sales of cigarettes and alcohol to minors—to protect them from making poor decisions that adversely affect their health—it may likewise seek to regulate sales of certain foods to youth.

How to Choose among the Policy Options

Given the three different economic rationales for government intervention, what policies are most appropriate? From an economic perspective, the primary goal is to repair the problem in the market. For example, the government can directly address the lack of information by requiring companies to provide it. One simple way to improve the food markets' efficiency is to expand the

NLEA to require that detailed nutritional information accompany all foods and menus. Adult consumers, at least, appear to respond to such information. One study finds that a media campaign urging people to shift from whole-fat to low-fat milk changed consumer purchases.⁶² Another study documents a consumer shift from high-fat toward low-fat salad dressing after product labels were required to reveal fat content.⁶³ Another finds that the NLEA decreased weight gain for white females who read labels while shopping and estimates that the NLEA's benefits totaled \$101 billion a year.⁶⁴

It is not clear, however, how to present nutrition and calorie information so that consumers, especially children and adolescents, can use and understand it. Further research is needed on how to make nutritional information comprehensible to children.

When the government makes information available, it must be careful to put it in a proper context; failure to do so can lead to unfortunate unintended consequences. For example, in 2003, in an effort to inform parents, Arkansas passed a law requiring schools to weigh children and to notify parents of their child's body mass index. Although the law provides parents with information they may have lacked, it has had some unforeseen negative consequences. Some muscular children have been incorrectly classified as overweight, and concerns have arisen about privacy and self-esteem.⁶⁵ Failing to put the information into its proper context also raises a risk that parents may impose ineffective or harmful fad diets.

Although the government can correct the problem of incomplete information in a relatively straightforward manner, it cannot so easily fix the other two problems—societal

costs of obesity and irrational consumers. The typical economic response to societal costs is to tax whatever imposes the cost or to subsidize behaviors that could decrease the societal costs. In this context, that would imply taxing obesity and subsidizing weight loss for the obese, but taxing people based on their weight or changes in weight would be difficult to implement and is politically unattractive. Subsidizing consumers who lose weight or maintain a healthy body weight would be similarly difficult to implement.

It is also hard to imagine how the government could implement a policy to enable children to become entirely rational consumers who take into account the future consequences of their actions. In the absence of an ideal policy to reduce societal costs and address children's "irrational" behavior, the question becomes whether other, "second-best" policies could both decrease obesity and do more good than harm for society overall.

Many possible second-best interventions exist. From the economic perspective, the correct way to choose among them is to analyze their cost-effectiveness. The first step in such analysis is to estimate all the costs and benefits associated with each intervention; the second is to rank the interventions according to how cheaply they achieve the policy goal, thus allowing policymakers to use a fixed budget most efficiently—to get, in other words, the most bang for the buck. Few anti-obesity interventions, however, especially those targeted to youth, have as yet been subjected to cost-effectiveness analysis. Nevertheless, I describe several possible second-best interventions.

Protecting Children from Advertising

If the government decides to protect children from advertising, one particular venue for in-

tervention is the public school system, where the government is solely responsible for the advertising environment. Under budgetary pressure, some school districts have signed contracts with Channel One, which gives them televisions, educational materials, and cash in exchange for allowing Channel One to advertise products such as candy, food, and soda pop directly to children in the classroom for two minutes each day.⁶⁶ The risk is that children who are a captive audience for such food advertising may increase both their consumption of the advertised foods and their risk of obesity. A cost-benefit analysis can determine whether the benefits of working with Channel One exceed the costs.

Some observers have advocated banning all food advertising to children in all venues.⁶⁷ Many developed countries, including Canada, Great Britain, and Australia, have banned all television advertising to children.⁶⁸ In the United States, however, Congress has historically tolerated little regulation of commercial speech. For example, the United States is one of only two industrialized countries (the other is New Zealand) to permit direct-to-consumer advertising of pharmaceuticals.⁶⁹ In 1979, the Federal Trade Commission (FTC) sought to regulate the television advertising of sugary cereals to children because of concerns about tooth decay. Congress, however, chose to recognize broad latitude for commercial speech and blocked the FTC from pursuing the case.⁷⁰

The U.S. government has shielded children from advertising in some cases. The 1992 Telephone Disclosure and Dispute Resolution Act, for example, bans advertising of 1-900 phone numbers to children younger than age twelve and requires that advertising directed to children younger than age eighteen include the warning that children need

their parents' permission to use the service. And in the mid-1990s the Food and Drug Administration adopted rules against advertising cigarettes near schools or in campaigns targeted to children.

Using Taxes and Subsidies to Change Behaviors That Cause Obesity

As noted, taxing or subsidizing people based on their weight or changes in weight would

It is also hard to imagine how the government could implement a policy to enable children to become entirely rational consumers who take into account the future consequences of their actions.

be politically unattractive and difficult to implement. However, some second-best tax and subsidy policies to alter behaviors may be feasible. For example, policymakers could implement taxes and subsidies that either discourage the consumption of certain foods or encourage physical activity. To evaluate whether such policies are worthwhile, policymakers must weigh their costs and benefits.

One could, for example, tax certain foods. Even though consuming food per se does not impose costs on society, a food tax might sufficiently decrease consumption that obesity would fall, cutting the costs imposed on society. Such taxes have been shown to affect food choices. A series of recent experiments confirms that even schoolchildren's purchases are sensitive to changes in the relative prices of foods.⁷¹

But taxing food involves several problems. The first is that although proponents often call for a “junk food” tax, it is not obvious which foods most contribute to obesity.⁷² Any food, if consumed in sufficient quantity, can contribute to calorie surplus and weight gain. Second, food taxes would be regressive, falling more heavily on poor families who spend a larger share of their income on food than do wealthier families.

The other major option is to subsidize behavior that decreases obesity-related societal costs. In essence, local governments already do that when they subsidize public parks, pools, and athletic facilities and when they provide free physical education, nutrition education, and sports teams in public schools. Government subsidies for installing sidewalks or for full-service supermarkets that stock fresh fruits and vegetables to operate in low-income or minority neighborhoods are other possible interventions.

Before governments increase funding for these programs, though, they should subject them to cost-benefit analyses. So far, subsidies for youth physical activity appear to have little effect. Children’s physical activity, for example, appears uncorrelated with the availability of local facilities or with neighborhood safety. Increased physical education requirements are associated with small changes in physical activity but have no detectable impact on weight or the probability of overweight.⁷³

Regulating Food Markets in Schools

Again, a special venue for intervention is the public school, where the government is responsible for the food environment. For example, states could require all schools to remove vending machines for soda and candy. Because children are not generally capable of choosing foods to achieve energy balance,

energy-dense foods such as sodas and candy may be the most likely to lead to energy imbalance and subsequent obesity (although, as noted, any food can cause obesity if consumed in sufficient quantity.) Schools could reconfigure meals to consist of low energy-dense foods that facilitate energy balance and serve portions that take into account the portion size effect observed in the research literature. A potential cost of removing vending machines and no longer selling energy-dense foods, however, is that schools may lose considerable revenue from “pouring rights” contracts with soft drink manufacturers and from cafeteria sales, revenue that may be used to advance the educational mission of the school.⁷⁴

A 2005 Government Accountability Office report found that many schools generate considerable revenue by selling foods outside of their school lunch programs. The report estimates that about 30 percent of all high schools generated more than \$125,000 per school through such sales, and that 30 percent of all elementary schools generated more than \$5,000 per school. The study found that schools typically use these revenues to offset losses associated with their other food service programs and to fund student activities. Cost-benefit analyses should take into account the impact of any decrease in these revenues that would result from a ban on energy-dense foods.⁷⁵

Mending or Ending Programs That May Inadvertently Contribute to Obesity

Government intervention could also take the form of modifying or canceling programs that contribute to obesity. For example, cost-benefit analyses could assess the net benefit of agricultural production subsidies and price supports. These programs clearly benefit farmers, and while some observers argue that

uninsurable crop risks and weather uncertainty justify this agriculture policy, others counter that current policy is designed primarily to transfer wealth to farmers and processors.⁷⁶ Farm policy contributes to obesity by lowering food prices, but its effect on weight may be small.⁷⁷ A cost-benefit analysis could help determine whether society is better off with or without current agriculture policies.

Another existing policy that the government can reconsider is the ban on lawsuits against food companies by plaintiffs who allege that the company's products made them obese. In 2004 twelve states adopted laws that block consumers from filing such lawsuits; so far in 2005 seven more states have followed, and nineteen more states are considering such laws.⁷⁸ But such blanket liability waivers remove the food industry's incentives to disclose information about the food's content, to exercise restraint in advertising to children, and to ensure the food's safety. Legal scholars are generally skeptical that torts against the food industry will be as successful as recent ones against tobacco companies, in part because no subset of foods can be proven to be solely responsible for causing obesity and therefore no single food or restaurant company can be shown to be liable.⁷⁹ But to encourage the food industry to keep its customers' welfare in mind, consumers need to be able to pursue such legal cases, which can always be thrown out if frivolous.

Assessing Cost-Effectiveness

Although cost-effectiveness analysis of anti-obesity initiatives is in short supply, some evidence exists. Studies, for example, have calculated the cost of saving a quality-adjusted life year (QALY) associated with specific interventions. (A quality-adjusted life year attempts to take into account the quality of the extra lifespan; for example, an extra year of

life in a persistent vegetative state receives a QALY score near zero whereas an extra year of life in perfect health receives a full QALY score of 1.) The decision rule for cost-effectiveness analysis is generally to implement the policy with the lowest cost per QALY and to continue implementing policies until either the initiative's budget is exhausted or the cost per QALY saved rises above some threshold. This threshold, historically \$50,000 per QALY, has more recently been raised to \$200,000, but other benchmarks are also used.⁸⁰ For example, Richard Hirth and several colleagues estimate that under various sets of circumstances, Americans are willing to pay from \$150,000 per QALY to more than \$425,000 per QALY.

The Centers for Disease Control and Prevention have conducted a multiyear project to assess the cost-effectiveness of seven "exemplary" interventions to increase physical activity. (None of the interventions was targeted at children and adolescents.) The study concludes that the lowest-cost exemplary intervention was Wheeling Walks, an eight-week, intensive community-wide intervention that promoted walking among sedentary fifty- to sixty-five-year-olds using paid media and public health activities at work sites, churches, and local organizations. That intervention cost \$14,286 per QALY saved.⁸¹ The other six interventions were estimated to cost between \$27,373 and \$68,557 per QALY saved. These estimates were for a forty-year analytic time horizon. For shorter time horizons the costs per QALY were considerably higher (more than \$100,000 for a ten-year horizon), because many health benefits of weight loss are reaped only later in life while the intervention's costs are always paid up front.

In contrast, estimates show bariatric surgery for the severely obese costs between \$5,400

and \$16,100 per QALY for women and \$10,700 to \$35,600 per QALY for men.⁸² Providing an anti-obesity drug to overweight patients with diabetes has been estimated to cost \$8,327 per QALY.⁸³ These studies indicate that there may be available a variety of cost-effective anti-obesity interventions, some involving prevention and others involving treatment.

Conclusion

Researchers have concluded that the market has contributed to overweight in children in primarily three ways over the past several decades. First, the real price of food fell (perhaps in part because of changing agriculture policies). Second, the time cost of food preparation rose for college graduates. And, third, technological changes created incentives to use packaged food rather than to prepare foods. Given the few additional daily calories that caused the rise in obesity over the past two decades, it will likely be impossible to know which of these changes is most responsible for the increase in obesity.

Several economic rationales justify government intervention in markets to address childhood obesity: a lack of information, youthful irrationality, and the societal costs of obesity. The government can address the lack of information easily and directly, but formulating policies to address the other two rationales is more difficult. Several second-best policies to reduce obesity exist, but it is as yet impossible to choose among them without cost-effectiveness studies. Once such studies are available, they will help policymakers achieve the greatest benefit from a fixed budget.

Americans can be optimistic about policy interventions' effectiveness in addressing obesity because small changes in flows of calories can have enormous impacts on individuals. One calculation implies that if Americans had consumed 50 fewer calories per day over the past twenty years, 90 percent of Americans could have avoided recent weight gains.⁸⁴ Even small changes in behavior today can substantially decrease childhood obesity in future decades.

Notes

1. Cynthia Ogden and others, "Prevalence and Trends in Overweight among U.S. Children and Adolescents, 1999–2000," *Journal of the American Medical Association* 288, no. 14 (2002): 1728–32. To avoid stigmatizing children, the highest clinical weight classification for children is "overweight" rather than obesity. However, in this paper I use the terms "overweight" and "obesity" interchangeably for children.
2. Cara B. Ebbeling, Dorota B. Pawlak, and David S. Ludwig, "Childhood Obesity: Public Health Crisis, Common Sense Cure," *Lancet* 360 (2002): 473–82; S. Y. S. Kimm and E. Obarzanek, "Childhood Obesity: A New Pandemic of the New Millennium," *Pediatrics* 110, no. 5 (2002): 1003–07; Rebecca Puhl and Kelly D. Brownell, "Stigma, Discrimination, and Obesity," in *Eating Disorders and Obesity: A Comprehensive Handbook*, edited by C. G. Fairburn and K. D. Brownell (New York: Guilford Press, 2002); Richard S. Strauss, "Childhood Obesity and Self-Esteem," *Pediatrics* 105, no. 1 (2000): e15–e20.
3. Jeffrey P. Koplan, Catharyn T. Liverman, and Vivica I. Kraak, eds., *Preventing Childhood Obesity: Health in the Balance* (Washington: National Academies Press, 2004).
4. The economic framework or model of eating, physical activity, and obesity is provided in detail in John Cawley, "An Economic Framework for Understanding Physical Activity and Eating Behaviors," *American Journal of Preventive Medicine* 27, no. 3 (2004): 1–9; John Cawley, "The Economics of Childhood Obesity Policy," in *Obesity, Business, and Public Policy*, edited by Zoltan Acs and Alan Lyles (Northampton, Mass.: Edward Elgar, forthcoming); and Darius Lakdawalla and Tomas J. Philipson, "Economics of Obesity," in *The Elgar Companion to Health Economics*, edited by Andrew Jones (New York: Edward Elgar, 2006).
5. James Hill and others, "Obesity and the Environment: Where Do We Go from Here?" *Science* 299, no. 7 (2003): 853–55.
6. U.S. Bureau of Labor Statistics, "Consumer Price Index—All Urban Consumers" (<http://data.bls.gov/PDQ/outside.jsp?survey=cu> [November 15, 2005]).
7. D. Lakdawalla and T. Philipson, "The Growth of Obesity and Technological Change: A Theoretical and Empirical Examination," Working Paper 8946 (Cambridge, Mass.: National Bureau of Economic Research, 2002).
8. Daron Acemoglu, "Technical Change, Inequality, and the Labor Market," *Journal of Economic Literature* 40, no. 1 (2002): 7–72.
9. J. P. Robinson and G. Godbey, *Time for Life: The Surprising Ways That Americans Use Their Time* (Pennsylvania State University Press, 1999); Roland Sturm, "The Economics of Physical Activity: Societal Trends and Rationales for Interventions," *American Journal of Preventive Medicine* 27, no. 3S (2004): 126–35.
10. D. M. Cutler, E. L. Glaeser, and J. M. Shapiro, "Why Have Americans Become More Obese?" *Journal of Economic Perspectives* 17, no. 3 (2003): 93–118.
11. U.S. Department of Labor, *Women in the Labor Force: A Databook*, Report 973 (Bureau of Labor Statistics, 2004).
12. P. M. Anderson, K. F. Butcher, and P. B. Levine, "Maternal Employment and Overweight Children," *Journal of Health Economics* 22 (2003): 477–504.

13. R. M. Blank, "Evaluating Welfare Reform in the United States," *Journal of Economic Literature* 40, no. 4 (2002): 1105–66.
14. Adam Drewnowski and S. E. Specter, "Poverty and Obesity: The Role of Energy Density and Energy Costs," *American Journal of Clinical Nutrition* 79, no. 1 (2004): 6–16.
15. Jane Reed, Elizabeth Frazao, and Rachel Itskowitz, "How Much Do Americans Pay for Fruits and Vegetables?" U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin no. 790, July 2004.
16. Bureau of Labor Statistics, "Consumer Price Index" (see note 6).
17. Biing-Hwan Lin, Joanne Guthrie, and Elizabeth Frazao, "Away-from-Home Foods Increasingly Important to Quality of American Diet," U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin no. 749, 1999.
18. Biing-Hwan Lin, Joanne Guthrie, and Elizabeth Frazao, "Quality of Children's Diets at and away from Home: 1994–96," *Food Review* 22, no. 1 (1999): 2–10.
19. Bureau of Labor Statistics, "Consumer Price Index" (see note 6).
20. Lin, Guthrie, and Frazao, "Away-from-Home Foods" (see note 17).
21. Ibid.
22. Lisa R. Young and Marion Nestle, "The Contribution of Expanding Portion Sizes to the U.S. Obesity Epidemic," *American Journal of Public Health* 92, no. 2 (2002): 246–49.
23. Brian Wansink, "Environmental Factors That Increase the Food Intake and Consumption Volume of Unknowing Consumers," *Annual Review of Nutrition* 24 (2004): 455–79; Barbara J. Rolls, "The Supersizing of America: Portion Size and the Obesity Epidemic," *Nutrition Today* 38, no. 2 (2003): 42–53; Jenny H. Ledikwe, Julia Ello-Martin, and Barbara J. Rolls, "Portion Sizes and the Obesity Epidemic," *Journal of Nutrition* 135, no. 4 (2005): 905–09.
24. Barbara J. Rolls, Dianne Engell, and Leann L. Birch, "Serving Portion Size Increases 5-Year-Old but Not 3-Year-Old Children's Food Intakes," *Journal of the American Dietetic Association* 100 (2000): 232–34.
25. Helen Smiciklas-Wright and others, "Foods Commonly Eaten in the United States, 1989–1991 and 1994–1996: Are Portion Sizes Changing?" *Journal of the American Dietetic Association* 103 (2003): 41–47.
26. John Cawley and Barrett Kirwan, "U.S. Agricultural Policy and Obesity," unpublished manuscript, Cornell University, 2005.
27. U.S. Department of Agriculture, "Sugar and Sweeteners: Policy" (www.ers.usda.gov/Briefing/Sugar/policy.htm#trqs [November 15, 2005]).
28. G. A. Bray, S. J. Nielsen, and B. M. Popkin, "Consumption of High-Fructose Corn Syrup in Beverages May Play a Role in the Epidemic of Obesity," *American Journal of Clinical Nutrition* 79, no. 4 (2004): 537–43; Michael Pollan, "The (Agri)Cultural Contradictions of Obesity," *New York Times*, October 12, 2003; Greg Critser, *Fat Land: How Americans Became the Fattest People in the World* (New York: Houghton Mifflin, 2003).

29. P. C. Westcott and J. M. Price, "Analysis of the U.S. Commodity Loan Program with Marketing Loan Provisions," U.S. Department of Agriculture, Agricultural Economic Report 801, 2001.
30. E. Douglas Beach and others, "An Assessment of the Effect on Land Values of Eliminating Direct Payments to Farmers in the United States," *Journal of Economic Development* 22, no. 2 (1997): 1–27.
31. B. Gardner, "U.S. Agricultural Policies since 1995, with a Focus on Market Effects in Grains and Oilseeds," Working Paper 02-17 (Department of Agricultural and Resource Economics, University of Maryland, 2002).
32. C. J. M. Paul and J. M. MacDonald, "Tracing the Effects of Agricultural Commodity Prices and Food Costs," *American Journal of Agricultural Economics* 85, no. 3 (2003): 633–46.
33. Cawley and Kirwan, "U.S. Agricultural Policy" (see note 26).
34. Harry M. Kaiser, "Distribution of Benefits and Costs of Commodity Checkoff Programs: Introductory Remarks," *Agribusiness* 19, no. 3 (2003): 273–75.
35. Noel Blisard, "Advertising and What We Eat: The Case of Dairy Products," in *America's Eating Habits: Changes and Consequences*, edited by Elizabeth Frazao, Agriculture Information Bulletin no. 750 (Washington: U.S. Department of Agriculture, 1999).
36. Ibid.
37. Brenda L. Boetel and Donald J. Liu, "Evaluating the Effect of Generic Advertising and Food Health Information within a Meat Demand System," *Agribusiness* 19, no. 3 (2003): 345–54.
38. The Pork Board, "2003 Checkoff Timeline Brochure" (www.porkboard.org/docs/checkoff%20timeline%20bro2003.pdf [November 15, 2005]); Dairy Management, Inc., "February 2005 Dairy Checkoff Update," press release (www.dairycheckoff.com/DairyCheckoff/MediaCenter/CheckoffUpdate/Postings/February+2005.htm [October 28, 2005]).
39. Anthony E. Gallo, "Food Advertising in the United States," in *America's Eating Habits: Changes and Consequences*, edited by Elizabeth Frazao, Agriculture Information Bulletin no. 750 (Washington: U.S. Department of Agriculture, 1999).
40. D. Kunkel, "Children and Television Advertising," in *Handbook of Children and the Media*, edited by D. Singer and J. Singer (Thousand Oaks, Calif.: Sage Publications, 2001).
41. H. L. Taras and M. Gage, "Advertised Foods on Children's Television," *Archives of Pediatrics & Adolescent Medicine* 149, no. 6 (1995): 649–52.
42. Roland Sturm, "Childhood Obesity: What We Can Learn from Existing Data on Societal Trends, Part 1," *Preventing Chronic Disease* 2, no. 1 (2005): 1–9.
43. K. Kotz and M. Story, "Food Advertisements during Children's Saturday Morning Television Programming: Are They Consistent with Dietary Recommendations?" *Journal of the American Dietetic Association* 94, no. 11 (1994): 1296–1300.
44. Gerard Hastings and others, "Review of Research on the Effects of Food Promotion to Children" (Centre for Social Marketing, University of Strathclyde, Glasgow, U.K., 2003).

45. Hastings and others, "Review of Research" (see note 44); D. Borzekowski and T. Robinson, "The 30-Second Effect: An Experiment Revealing the Impact of Television Commercials on Food Preferences of Preschoolers," *Journal of the American Dietetic Association* 101, no. 1 (2001): 42–46.
46. American Academy of Pediatrics, "Children, Adolescents, and Advertising," *Pediatrics* 95, no. 2 (1995): 295–97; Koplan, Liverman, and Kraak, *Preventing Childhood Obesity* (see note 3).
47. Richard S. Strauss and Harold A. Pollack, "Epidemic Increase in Childhood Overweight, 1986–1998," *Journal of the American Medical Association* 286, no. 22 (2001): 2845–48.
48. R. P. Troiano and K. M. Flegal, "Overweight Children and Adolescents: Description, Epidemiology, and Demographics," *Pediatrics* 101, no. 3 (1998): 497–504.
49. Kimberly Morland and others, "Neighborhood Characteristics Associated with the Location of Food Stores and Food Service Places," *American Journal of Preventive Medicine* 22, no. 1 (2002): 23–29.
50. Diane Gibson, "Neighborhood Characteristics and the Local Food Environment: Supermarket Availability in the 50 Largest Cities in the United States," Working Paper (Baruch College, City University of New York, 2005).
51. Kimberly Morland, Steve Wing, and Ana Diez Roux, "The Contextual Effect of the Local Food Environment on Residents' Diets: The Atherosclerosis Risk in Communities Study," *American Journal of Public Health* 92, no. 11 (2002): 1761–67.
52. Joel Waldfogel, "The Median Voter and the Median Consumer: Local Private Goods and Residential Sorting," unpublished manuscript, University of Pennsylvania, 2004.
53. Penny Gordon-Larsen and others, "Inequality in the Built Environment Underlies Key Health Disparities in Physical Activity and Obesity," *Pediatrics* (forthcoming).
54. R. Ewing and others, "The Relationship between Urban Sprawl and Physical Activity, Obesity, and Morbidity," *American Journal of Health Promotion* 18, no. 1 (2003): 47–57; Lawrence Frank, Martin Andresen, and Tom Schmid, "Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars," *American Journal of Preventive Medicine* 27 (2004): 87–96.
55. J. M. Zakarian and others, "Correlates of Vigorous Exercise in a Predominantly Low SES and Minority High School Population," *Preventive Medicine* 23 (1994): 314–21; J. F. Sallis and others, "Predictors of Change in Children's Physical Activity over 20 Months: Variations by Gender and Level of Adiposity," *American Journal of Preventive Medicine* 16, no. 3 (1999): 222–29.
56. Centers for Disease Control and Prevention, "Smoking Prevalence among U.S. Adults" (www.cdc.gov/tobacco/research_data/adults_prev/prevali.htm [November 15, 2005]).
57. Centers for Disease Control and Prevention, "Cigarette Use among High School Students—United States, 1991–2003," *Morbidity and Mortality Weekly Report* 53, no. 23 (2004): 499–502.
58. U.S. Department of Health and Human Services, *The Health Benefits of Smoking Cessation: A Report of the Surgeon General* (Rockville, Md.: Centers for Disease Control and Prevention, 1990).
59. Shin-Yi Chou, Michael Grossman, and Henry Saffer, "An Economic Analysis of Adult Obesity: Results from the Behavioral Risk Factor Surveillance System," *Journal of Health Economics* 23, no. 3 (2004): 565–87.

60. Jonathan Gruber and Michael Frakes, "Does Falling Smoking Lead to Rising Obesity?" Working Paper 11483 (Cambridge, Mass.: National Bureau of Economic Research, 2005).
61. E. Finkelstein, I. Fiebelkorn, and G. Wang, "National Medical Spending Attributable to Overweight and Obesity: How Much and Who's Paying?" *Health Affairs Web Exclusive*, May 14, 2003.
62. B. Reger, M. G. Wootan, and S. Booth-Butterfield, "Using Mass Media to Promote Healthy Eating: A Community-Based Demonstration Project," *Preventive Medicine* 29 (1999): 414–21.
63. Alan Mathios, "The Impact of Mandatory Disclosure Laws on Product Choices: An Analysis of the Salad Dressing Market," *Journal of Law and Economics* 43, no. 2 (2000): 651–77.
64. Jayachandran N. Variyam and John Cawley, "Nutrition Labels and Obesity," paper presented at the 2005 Association for Public Policy Analysis and Management Conference, Washington, November 3, 2005.
65. Health Policy Tracking Service: A Thomson West Business, July 11, 2005.
66. Koplan, Liverman, and Kraak, *Preventing Childhood Obesity* (see note 3).
67. Marion Nestle, *Food Politics: How the Food Industry Influences Nutrition and Health* (University of California Press, 2002); E. Schlosser, *Fast Food Nation: The Dark Side of the All-American Meal* (New York: Houghton Mifflin, 2001).
68. Dale Kunkel and others, *Report of the APA Task Force on Advertising and Children* (Washington: American Psychological Association, 2004).
69. Ernst Berndt, "The United States' Experience with Direct-to-Consumer Advertising of Prescription Drugs: What Have We Learned?" Unpublished manuscript, Massachusetts Institute of Technology.
70. *Ibid.*; Mary Engle, testimony before the Institute of Medicine's Committee on Prevention of Obesity in Children and Youth, Washington, December 9, 2003.
71. S. A. French and others, "A Pricing Strategy to Promote Low-Fat Snack Choices through Vending Machines," *American Journal of Public Health* 87, no. 5 (1997): 849–51; S. A. French and others, "Pricing and Promotion Effects on Low-Fat Vending Snack Purchases: The CHIPS Study," *American Journal of Public Health* 91 (2001): 112–17; P. Hannan and others, "A Pricing Strategy to Promote Sales of Lower Fat Foods in High School Cafeterias: Acceptability and Sensitivity Analysis," *American Journal of Health Promotion* 17, no. 1 (2002): 1–6.
72. Koplan, Liverman, and Kraak, *Preventing Childhood Obesity* (see note 3).
73. Zakarian and others, "Correlates of Vigorous Exercise" (see note 55); Sallis and others, "Predictors of Change" (see note 57); John Cawley, Chad Meyerhoefer, and David Newhouse, "The Impact of State Physical Education Requirements on Youth Physical Activity and Overweight," Working Paper 11411 (Cambridge, Mass.: National Bureau of Economic Research, 2005).
74. Patricia M. Anderson and Kristin F. Butcher, "Reading, Writing, and Raisinets: Are School Finances Contributing to Children's Obesity?" Working Paper 11177 (Cambridge, Mass.: National Bureau of Economic Research, 2005).
75. U.S. Accountability Office, "School Meal Programs: Competitive Foods Are Widely Available and Generate Substantial Revenues for Schools," GAO-05-563 (Washington, GAO, 2005).

76. James E. Tillotson, "Pandemic Obesity: Agriculture's Cheap Food Policy Is a Bad Bargain," *Nutrition Today* 38, no. 5 (2003): 186–90.
77. Gardner, "U.S. Agricultural Policies since 1995" (see note 31); Paul and MacDonald, "Tracing the Effects" (see note 32); Cawley and Kirwan, "U.S. Agricultural Policy and Obesity" (see note 26).
78. Health Policy Tracking Service (see note 65).
79. Todd G. Buchholz, *Burger, Fries, and Lawyers: The Beef behind Obesity Lawsuits* (Washington: U.S. Chamber Institute for Legal Reform, 2003); Richard A. Daynard, Lauren E. Hash, and Anthony Robbins, "Food Litigation: Lessons from the Tobacco Wars," *Journal of the American Medical Association* 288, no. 17 (2002): 2179–81.
80. Larissa Roux, "Evaluation of Potential Solutions to the Health and Economic Problems Presented by Physical Activity: A Cost-Utility Analysis," unpublished manuscript, Centers for Disease Control and Prevention, 2005; R. A. Hirth and others, "Willingness to Pay for a QALY: In Search of a Standard," *Medical Decision Making* 20, no. 3 (2000): 332–42.
81. Roux, "Evaluation of Potential Solutions" (see note 80).
82. J. Fang, "The Cost-Effectiveness of Bariatric Surgery," *American Journal of Gastroenterology* 98, no. 9 (2003): 2097–98.
83. A. Maetzel and others, "Economic Evaluation of Orlistat in Overweight and Obese Patients with Type 2 Diabetes Mellitus," *Pharmacoeconomics* 21, no. 7 (2003): 501–12.
84. Hill and others, "Obesity and the Environment" (see note 5).