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## U.S. Food Policy and Obesity

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### 1. Introduction

The obesity epidemic has been identified as the most critical public health issue facing the United States today, but it is not confined to the United States or even to high-income countries. It is a global phenomenon that reaches the entire spectrum of the income distribution, and particularly the poorest individuals within rich countries and the middle- and high-income individuals in the poorest countries. Many policies have been proposed to counter obesity, and some of those proposed policies focus on altering the food system—to influence food consumption habits and thus nutrition and obesity by changing the choices available to consumers or by changing the incentives to choose. Indeed, some jurisdictions have already introduced policies restricting the sale of certain food items in schools and others have introduced taxes on certain caloric beverages. This chapter reviews what is known about the causal links between food policies and obesity and presents new evidence about the likely efficiency and effectiveness of particular proposed policies as remedies for obesity.

We begin with a discussion of the economic rationale for government intervention in the economy to reduce the prevalence of obesity. While we note the ‘public health’ rationale and related arguments and instruments, our work is concerned with economic arguments and policies that work through the market for food. The economic rationale for obesity policy is based on the presence of externalities in health care (public and private) (e.g., Bhattachayra and Sood 2011; Finkelstein, Fiebelkorn, and Wang 2003; Finkelstein et al. 2009), and myopic preferences whereby individuals discount utility in distant future periods at a higher rate than in the near term (Cutler, Glaeser and Shapiro 2003; Freebairn 2010). We conclude that a basis for some such intervention exists, beyond paternalism, because some of the costs of one person’s obesity are borne by others through the public health-care system. The issue then, for economists, is what is the appropriate form of market intervention? Using food policies as obesity policy is an inherently ‘second-best’ approach because the economic distortion does not stem from a distortion in the price of food. For example, obese individuals may create a negative externality for non-obese individuals through health insurance because of pooling of heterogeneous risk groups. In this case, a ‘first-best’ solution may be to charge obese individuals greater health care premiums. However, it seems likely that many people would find such a solution unacceptable, making it politically infeasible. Hence, some current policies addressing rising obesity rates have targeted changing the inputs to obesity (i.e., food consumption and physical activity).

The next major part of the chapter reviews and assesses evidence on the effects of current food policies that, according to some writers, have contributed to increasing or reducing obesity. Included in this set of policies are farm subsidies, agricultural research and development (R&D), public food and nutrition assistance programs, nutrition and health education programs, and regulations. We present evidence to show that farm subsidies have had negligible impacts on obesity (if anything, the net effect of farm support has been to increase the cost of food and thus reduce obesity), and that the Food Stamp Program (a large food assistance program), likewise, has had insignificant effects, on obesity rates. On the other hand, agricultural R&D has contributed to significant movements in the relative prices of food commodities and has most likely contributed to obesity while also yielding great benefits to society through reducing food costs for both rich and poor, thin and fat alike, and reducing pressure on natural resource stocks. In addition, we review a significant literature on the effects of nutrition labels on food for consumption in the home or away from home, the implications of changing nutrition education in schools, and the potential impacts of restrictions on what may be sold in schools. We present an up-to-date assessment of the main findings from this contemporary literature.

The third main part of this chapter presents an assessment of the likely impacts and potential usefulness of a long list of policy instruments that have been proposed—or, in some cases, adopted—to reduce the prevalence and social costs of obesity. This assessment consists of a synthesis of results from the literature and our own work in the area. One set of policies to be considered are taxes on particular foods, farm commodities as ingredients of food (e.g., sugar), or nutrients (e.g., trans fats) that affect obesity. Such policies generally are found to have small effects on food consumption, obesity and overall nutrition and health; to be regressive; and to enhance government revenue but sometimes with large social welfare costs (e.g., Kuchler, Tegene, and Harris 2004; Chouinard et al. 2007). However, Okrent and Alston (2012) found that taxes on calories would be comparatively efficient as a means of reducing obesity, and would yield significant net social benefits. Some have proposed changes to food and nutrition programs, to limit the use of food stamps (SNAP benefits) to certain types of ‘healthy’ foods, but economic arguments suggest that such changes may introduce more problems than they would solve (Alston et al. 2009). Other policies have been suggested, including some directed to reducing food deserts (Ver Ploeg et al. 2009) and others to do with banning advertising of fast food or otherwise regulating the food industry. These policies are also discussed briefly.

The chapter concludes with a brief synopsis of the main issues addressed and some central findings regarding the potential roles for food policy as obesity policy, which food policy instruments are potentially worthwhile, and how well they compare with other types of policies directed towards reducing obesity. Our presentation and evidence is centered on the United States, and specific to U.S. policies and institutions, but the general arguments and findings are more broadly applicable.

## **2. The rationale for government intervention to address obesity**

The existence of large social costs of obesity alone does not justify any response by the government (Philipson and Posner 1999; Philipson and Posner 2003; Cawley 2004). Economic justifications for policies aimed at reducing obesity could rest on the existence of externalities or other economic distortions that mean the costs of being obese are not all

borne by the obese individual. For instance, heavier people take up more space and impose costs on others who have to share space with them in planes, trains, automobiles, and elevators. Absent appropriate pricing policies, these costs are shared without compensation. Perhaps more serious is the phenomenon of pooling health-care system costs, both through private insurance and through Medicare and Medicaid. However, such cost pooling alone might not involve significant distortions in behavior or in total costs of obesity, and therefore it might not justify intervention by the government on economic efficiency grounds. Bhattacharya and Sood (2011) found that the extent of moral hazard in this context—whereby the fact that costs of obesity are pooled induces responses that result in greater social costs of obesity—is quite modest. Furthermore, Bhattacharya and Sood (2011) found that the incremental health-care costs associated with obesity are passed on to obese workers with employer-sponsored health insurance in the form of lower cash wages. If this is true, some other justification for intervention is required.

Freebairn (2010) proposed two other sources of spillover effects of obesity that could be used to provide a public-goods argument to justify government intervention. First, some health-care costs are borne by government expenditure, and the use of general taxation measures to raise revenues to finance such expenditures entails deadweight losses (mainly from distortions in the labor market) such that the marginal social cost of government spending is likely to be in the range of \$1.20 per dollar. Second, people who are obese are less productive than others, and have more days lost to illness, and consequently contribute less in income taxation to the total pool of government revenue available for spending on public goods. Parks, Alston, and Okrent (2011) estimated that a one pound per person increase in average adult body weight in the United States would add \$749 million to annual U.S. public health expenditure. This is a lower bound estimate of the marginal social cost of the obesity externality.

A different kind of public goods argument for intervention relates to the economics of information: the government could play a role in the provision of information about the health consequences of diet to the extent that the private sector does not have sufficient incentive to do so, or in the design of appropriate regulations over the labeling of products with respect to their nutritional characteristics. The appropriate place to draw the line in such roles is far from clear, given that the private sector has some incentive to provide information that consumers demand.

To some extent at least, the arguments for government intervention related to obesity rest on paternalism—that individuals do not know what is best for them, or are unable for some reason or other to act in ways that are in their best interest, and that the state can help them make happier choices. To many people, the notion that the government could play a role in individual consumption choices—even with respect to the nutrition of infants and children—may be anathema. But this is a complex and difficult issue, an area of life in which many people are clearly unhappy with the ultimate cumulative and enduring consequences of their individual consumption choices, presumably made freely and willingly.

The psychological and the biophysical linkages between food consumption, other behavior, and obesity are complicated and dynamic, and not fully understood. To some extent, a propensity for obesity can be inherited genetically. But also, as with addictive substances like nicotine and alcohol, a propensity for obesity can be acquired through experience, beginning in infancy, or even in the womb. Such dynamic complexities, in which the daily

choices made by parents can have lifelong implications for the opportunities faced by their children, are not confined to obesity; and, like other elements of child health and education, this aspect of the obesity problem may be seen by some people as a justification for policy intervention.

Obesity policy is easily justified if the policy results in a Pareto improvement in societal well-being, i.e., if the policy makes some people better off and leaves everyone at least as well off as they were before the implementation of the policy. A less stringent criterion is the Kaldor-Hicks criterion, of a potential Pareto improvement: a case where some people are made worse off by a policy change but the beneficiaries could afford to compensate the losers and still be better off. It is referred to as a potential Pareto improvement in that the compensation need not take place. This criterion for a net national benefit from a policy change is implicit in most economic discussions. Policies that effectively reduce the rate of obesity in the population would improve the health of the individuals who lose weight, benefiting them directly, and at the same time would reduce the external costs they impose on others. Such obesity policy is worthwhile, according to the Kaldor-Hicks criterion, so long as the societal benefits outweigh the costs (Deaton 2002; Just, Hueth, and Schmitz 2004, p. 32).

An alternative rationale for government intervention is the ‘public health’ rationale: health is a public good and the mission of public health is “fulfilling society’s interest in assuring conditions in which people can be healthy” (Institute of Medicine 1988). The philosophy of social justice forms the foundation of the public health mission, that is, the public health system aims to overcome the societal barriers that prevent the equal distribution of health burdens and benefits across the population (Turnock 2004). Public health tools include the “Let’s Move” campaign, increased monitoring of obesity prevalence, and stricter school food regulations. Given that low-income individuals in the United States experience more extreme obesity (BMI > 35) than higher-income individuals, and that some of this disparity may be attributable to the societal conditions associated with living in poverty (e.g., lack of health insurance and access to fresh fruits and vegetables), there is a social justice or public health argument for public policy to reduce obesity (Jolliffe 2010).<sup>1</sup> While we acknowledge this alternative rationale for policy, in this chapter we focus on policies that operate through markets for food, for which the relevant rationale must be an economic one.

### 3. Effects of past and current food policies on obesity

The increased prevalence of obesity in the United States has been attributed to past and current policies directed at both producers and consumers of food. Policies directed at improving the welfare of farmers (i.e., farm subsidies and investment in agricultural R&D) and low-income families (i.e., food and nutrition assistance programs) may have inadvertently contributed to increased consumption of food, calories and body weight. In addition, policies directed at providing better health and nutrition information (including food labels) to consumers so as to help them make better-informed consumption decisions, may have been ineffective. This section examines the literature on the effects of past and current food policies on obesity, with an emphasis on U.S. policies.

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<sup>1</sup> In the United States the most common definition of low-income is an individual or household that has an income at or below 130 percent of the federal poverty line.



### 3.1 Farm subsidies

The United States has a long history of agricultural policy and many commentators—including prominent economists, nutritionists, journalists, and politicians—have claimed that American farm subsidies have contributed significantly to the ‘obesity epidemic.’ They argue that farm subsidies have made fattening foods relatively cheap and abundant, and that reducing these subsidies will go a long way towards solving the problem. These commentators often treat the point as self-evident, and do not present details on the mechanism by which farm subsidies are supposed to affect obesity, nor evidence about the size of the likely impact. In particular, Pollan (2003, 2007) has claimed that subsidies on commodities such as corn and wheat have led to lower prices of high-calorie, processed foods. As proof of this effect, Pollan has pointed to the correlation between increased subsidies to corn farmers and rising obesity rates in the United States between 1970 and 2005. Likewise, Nestle (2002), Tillotson (2004), Muller, Schoonover and Wallinga (2007), Ludwig and Pollak (2009) and Popkin (2010) have attributed the growth in U.S. obesity rates to agricultural policies, and advocated a reorientation of government spending away from corn and wheat to fruits, vegetables and whole grains.

Farm commodity programs can affect the rate of obesity by changing the relative prices of food commodities and thus retail foods, and hence, the composition of food consumption. However, several studies have demonstrated that the magnitude of this effect in the United States is likely to have been small and ambiguous (Alston, Sumner, and Vosti 2006; Alston, Sumner, and Vosti 2008; Beghin and Jensen 2008; Miller and Coble 2007; Rickard, Okrent, and Alston 2011; Schmidhuber 2004; Senauer and Gemma 2006). This finding has several elements.

It is true that farm subsidies have resulted in lower U.S. prices of some commodities such as food and feed grains, and consequently, lower costs of producing cereals and bakery products and meats. However, the price-depressing effects of subsidies has been contained (or even reversed) by the imposition of additional policies like acreage set-asides that restrict production. In addition, since 1996, about half of the total subsidy payments have become decoupled from production and based on historical rather than current acreage and yields (Alston, Sumner and Vosti 2008; Sumner 2005; Beghin and Jensen 2008). Reflecting these facts about the policies, complete elimination of U.S. commodity subsidies would have minimal effect on corn, wheat or rice production and hence prices: 9–10 percent decrease in price of corn, 4–6 percent decrease in price of rice and 6–8 percent decrease in price of rice (Sumner 2005).

Conversely, some farm commodity programs have actually increased the prices of commodities. Trade barriers on sugar, dairy and orange juice have increased the cost of these commodities to U.S. buyers and the U.S. food industry. The combination of subsidies for some commodities and trade barriers for others makes the story complicated at times. A case in point is the market for caloric sweeteners. Corn is often the target of criticism as a contributor to obesity, especially because of its use to make high fructose corn syrup (HFCS), which is used as a caloric sweetener in many foods and beverages. The use of HFCS as a sweetener has been encouraged by U.S. sugar policy that made sugar much more expensive and gave food manufacturers an economic incentive to substitute HFCS for sugar. So, farm subsidies are responsible for the growth in the use of corn to produce HFCS as a caloric sweetener, but not in the way that is often suggested. The culprit here is not corn

subsidies; rather, it is sugar policy that has restricted imports, driven up the U.S. price of sugar, and encouraged the replacement of sugar with alternative caloric sweeteners. Combining the sugar policy with the corn policy, the net effect of farm subsidies has been to increase the price of caloric sweeteners generally, and to discourage total consumption while causing a shift within the category between sugar and HFCS. In this context, the subsidy policies effectively increase the overall price of caloric sweeteners; removing policies applied to sweeteners would lead to an overall increase in consumption of sweeteners (Alston, Rickard, and Okrent 2010).

### 3.2 Agricultural R&D

Other agricultural policies may have had more significant effects on obesity. Alston, Sumner and Vosti (2006, 2008) suggested that productivity gains resulting from agricultural research and development (R&D) have been much more important than commodity subsidies as a determinant of food prices. In real terms agricultural commodity prices trended down significantly during the past 50 years, reflecting growth in supply of agricultural products outstripping growth in demand that was fueled by increases in population and per capita incomes. Alston, Beddow and Pardey (2009) attributed these trends in prices primarily to growth in farm productivity, which they ascribed primarily to public and private investments in agricultural R&D. Likewise, Miller and Coble (2007, 2008) estimated that increases in total factor productivity contributed more to lowering prices of retail food products, and thus, the portion of income spent on food, than did subsidies to farmers in the United States and across OECD countries. Beghin and Jensen (2008) also attributed substantial declines in the price of corn, and hence, HFCS and food products that use HFCS to technical change rather than subsidies.

### 3.3 Public food and nutrition programs

Several studies have investigated the effects of participation in Food and Nutrition Programs (FANPs) on obesity (e.g., see Ver Ploeg, Mancino, and Lin 2007). This section emphasizes the three main programs: the *Food Stamp Program* (FSP), which in 2008 was revised and renamed the *Supplemental Nutrition Assistance Program* (SNAP); the *Special Supplemental Nutrition Program for Women, Infants, and Children* (WIC); and the *National School Lunch Program* (NSLP).<sup>2</sup>

The FSP has been much studied, with much of the research based on analysis of data from large national surveys, and mainly concerning impacts on household food expenditures, household nutrient availability, and individual dietary intakes. The research suggests that, participation in the FSP increases household availability of energy and protein and perhaps some vitamins and minerals. Less evidence is available about the impacts on individuals' dietary intakes. Fox, Hamilton, and Lin (2004a, b) concluded that results were mixed and

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<sup>2</sup> While the FSP (or SNAP), WIC, and NSLP are by far the largest and most widely available FANPs, other FANPs are important for different subsets of the population. For example, the School Breakfast Program (SBP) serves about 10.6 million children per day, compared to the NSLP's 31.3 million. The Child and Adult Care Food Program (CACFP) serves about 1,831.1 million meals a year to children in day care, and 64.2 million meals a year to adults, with about 3.3 million participants a day receiving a meal. Together, the SBP and the CACFP cost \$5.1 billion per year, compared with \$10 billion for the NSLP in 2009. The other seven smaller programs together cost only \$1.2 billion annually.

collectively inconclusive concerning impacts of the FSP on several other nutrition- and health-related outcomes (such as birth weight, height, weight, nutritional biochemistries, and general measures of health status). Although the findings are mixed, the balance of the evidence (weighing those studies that have done a better job of addressing the perennial econometric challenges) indicates that women who participate in the FSP are more likely to be obese, with estimated probabilities ranging from 6 to 9 percent (Gibson 2003; Chen, Yen and Eastwood 2005; Meyerhoefer and Pylypchuk 2008). However recent work by Fan (2010) found no effect of long- or short-run FSP participation by women on obesity once pre-participation weight and other socio-economic and demographic factors were taken into account. More-recent research by Parks (2011) demonstrated that low-income women who participated in the FSP at some point in the previous year did not gain significantly more weight over the past year than eligible women who did not participate.

Studies of the impact of WIC have emphasized impacts on health-and nutrition-related outcomes of participants, which is the primary goal of WIC, unlike the other FANPs. Among others, obesity and abnormal gestational weight gain are both considered nutritional risk factors that qualify women for participation in WIC. The available evidence suggests that WIC participation increases the intakes by pregnant women of most of the target nutrients; less clear is whether it has led to a greater prevalence of adequate intakes, and little evidence is available on whether the dietary intakes of WIC participants are more-closely aligned with the *Dietary Guidelines for Americans*. Likewise, very little compelling evidence is available on the impacts of WIC on dietary intakes of participating children or on their nutrition and health characteristics. However, a range of evidence indicates that WIC has had significant impacts on dietary intake of infants, including particular nutrients that are largely associated with the consumption of cow's milk versus formula and the introduction of solid foods. In particular, WIC has significantly reduced the prevalence of anemia among low-income American children. Children from households with WIC participants also tended to have better general health status, more so for the lowest-income children, and a higher probability of having up-to-date immunizations.

Some writers have suggested that the NSLP and other school meals programs may have contributed to rising rates for obesity among school children.<sup>3</sup> Ralston, Newman, Clauson, Guthrie and Buzby (2008) provided a comprehensive discussion of the NSLP, including historical trends, participant characteristics, and challenges facing administrators of the program, including tradeoffs between nutritional quality of foods served, costs, and participation—which they refer to as a school meals 'trilemma'—as well as between program access and program integrity. The authors reported that program participation has had little if any measurable impact on caloric intake or obesity; that participants derive important nutritional benefits from participating in the program, including higher intake of key nutrients and under-consumed foods and lower intake of sweets, but also have high intakes of fat and sodium. A significant part of the problem of nutritional quality is associated with costs. Many schools depend on revenues from 'competitive foods,' even though such foods have been found to contribute to overconsumption of calories, increased plate waste of nutritionally balanced NSLP lunches, and decreased intakes of nutrients by students.

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<sup>3</sup> Other factors contributing to obesity related to eating at school include the availability of dispensers for candy, sodas, or fast foods, and the proximity of fast-food restaurants.



### 3.4 Nutrition and health education (including food labels)

Consumers make decisions on what foods to purchase based on information on prices and attributes of foods (e.g., convenience, healthiness, and so on). If individuals do not have a clear understanding of the health attributes of foods and how foods affect body weight, or they are unaware of the connection between obesity and higher risks of chronic illnesses, then individuals may be inadvertently choosing foods that cause their weight to deviate from the medically ideal body weight. Two types of information on diet and nutrition are relevant: (i) information on the negative health aspects of obesity, and (ii) information on how food consumption translates into personal weight gain or loss. In the United States, studies find that many individuals do not have a clear understanding of the diet-disease connection. Some evidence shows that increases in individual diet-disease knowledge significantly decrease the probability that an individual is obese and suggests that new policies to increase diet-disease health knowledge should lead to decreases in the incidence of obesity (Nayga 2000; Falba and Busch 2005). For example, Nayga (2000) estimated that complete acquisition of diet-disease knowledge could reduce the likelihood of an individual being obese to roughly 20%. This estimate of the impact of information is large and most likely overstated because of endogeneity between diet-disease knowledge and BMI: individuals who are more knowledgeable about the connection between diet and risk of disease are more likely to be those who have made weight management a priority for reasons that are unobserved, and not controlled for in estimation.

The second type of information concerns individual understanding of the translation from current food consumption into future weight outcomes. Nutritional labeling increases the ability of an individual to predict the effect of food consumption on future weight. In the United States, many studies that examine the effect of nutritional labels on grocery store purchases utilize variation between 1992 and 1999, before and after the passage of the National Labeling and Education Act (NLEA). Labels existed before the NLEA under the voluntary labeling rules established by the Food and Drug Administration (FDA) in 1975, but they were not on all packaged foods and were not standardized. Mojduszka and Caswell (2000) examined labeling information on packages in 33 food product categories and concluded that incentives for voluntary disclosure of nutritional content by food processing firms prior to the NLEA did not generally result in reliable and consistent nutrition information being made available to consumers. Mathios (2000) found that prior to the NLEA, all low-fat salad dressings had a nutrition label, while the majority of higher-fat dressings did not, and sales for those with the highest fat levels declined significantly after the NLEA. Variyam and Cawley (2007) compared the change in body weight, after the implementation of NLEA, among those who use labels when food shopping to that among those who do not use labels. They found that non-Hispanic white women benefited the most from nutritional labeling, with an estimated 3.36 percent reduction in obesity associated with label use, whereas the new labels had no effect on the body weight of white men and black women and were actually associated with an increase in the body weight of black men.

Variyam (2005) noted that the NLEA exempts much of the food consumed at restaurants from mandatory labeling regulations. Because consumers are less likely to be aware of the ingredients and nutrient content of restaurant foods than of foods prepared at home, public health advocates have called for mandatory nutrition labeling for major sources of these foods, such as fast-food restaurants and chain restaurants. Recent studies have begun to examine the effect of mandatory calorie postings on restaurant menus in New York City. Downs et al.

(2009) utilized receipts collected from patrons outside two burger restaurants and a coffee shop in New York City before and after the mandate, and found little evidence of any effect of calorie postings on consumption. Elbel et al. (2009) also utilized receipts collected from patrons outside 14 chain restaurants in New York City and five chain restaurants in Newark, New Jersey. Similar to Downs, Loewenstein and Wisdom (2009) they found little evidence to suggest that the labels had any effect on consumption. However, Bollinger, Leslie and Sorensen (2010) found that mandatory calorie posting influenced consumer behavior at Starbucks, resulting in a 6% decrease in the average calories per transaction (down from 247 to 232 calories per transaction). Almost all of the observed effect was related to food purchases, where average food calories per transaction fell by 14%. Interestingly, they also found that calorie postings did not result in any statistically significant change in Starbucks' total revenue.

### 3.5 Regulation

The majority of evidence indicates that unregulated food marketing to children has contributed to the obesity problem. Concern has been expressed about the consequences of marketing food and other goods to children since the 1970s, but no progress has been made in establishing regulations that the government would enforce. Rather, the United States has relied on the food industry to regulate itself (Wilde 2009). Children under the age of approximately 8 (and possibly as old as 11) are especially vulnerable to food advertising because they cannot distinguish the content in a television program from the content in a commercial, or comprehend that the purpose of an advertisement is to persuade. The research summarized by the American Academy of Pediatrics (2006) and the Institute of Medicine (IOM)(2005) showed that television advertising – which only accounts for a fraction of the total advertising children are exposed to – strongly affects food preferences, short-term consumption (versus 'usual dietary intake'), and purchase requests in 2–11 year olds. Some evidence suggests that advertising affects beliefs about foods and beverages and usual dietary intakes among children 2–11 and 2–5 years of age, respectively (American Academy of Pediatrics 2006; IOM 2005)<sup>4</sup>. In 2005, the IOM called on the U.S. food industry to self-regulate and reduce the prominence of energy-dense and nutrient-poor foods in advertisements aimed at children. However, the IOM also noted that, if self-regulation failed to achieve this goal, Congress should step in and enact policy that would mandate the changes in marketing to children (Institute of Medicine 2005; Wilde 2009).

## 4. Proposed and potential food policies

Rising (or just high) rates of obesity, especially among children, have attracted the attention of governments worldwide. The issue is significant in the United States. Food and nutrition policy that was once devoted to issues of food security and inadequate nutrition must now confront the modern malnutrition paradox: poor people having poor dietary quality and food insecurity while at the same time experiencing the health consequences of overeating and sedentary lifestyles. Many proposals for policies to address this situation have been

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<sup>4</sup> Usual dietary intake refers to the long-term dietary intake patterns of an individual, i.e., the average daily intakes of different dietary components over a year. Short-term consumption refers to consumption during a specific time frame following a particular stimulus or event, e.g., the number of potato chips and apple slices consumed after exposure to a potato chip advertisement (IOM 2005).

suggested, including changes to existing food and nutrition programs, as well as other policies that also work through changing the effective prices or availability of food generally, or particular foods. Some such policies have already been introduced in some places (e.g., 35 states had a sales tax on soda in 2011).<sup>5</sup>

#### 4.1 Food taxes and subsidies

Economists have modeled and measured the potential impacts of various taxes and subsidies as instruments for reducing obesity. Some studies suggest that taxation or subsidization of certain foods would be effective as means of reducing average body weight in the United States and in other developed countries (Smith, Lin, and Lee 2010; O'Donoghue and Rabin 2006; Cash, Sunding, and Zilberman 2005; Sacks et al. 2011). A tax on a class of foods that are energy dense and deemed 'unhealthy' (e.g., soda and chips) would make 'unhealthy' foods more expensive relative to 'healthy' foods such that consumers would substitute away from consumption of 'unhealthy' foods and into consumption of 'healthy' foods. Others have argued that such pricing policies would have little effect on food consumption, and hence obesity and may also be regressive (Schroeter, Lusk, and Tyner 2007; Kuchler, Tegene and Harris 2004; Gelbach, Klick, and Strattman 2007; Allais, Bertail, and Nichèle 2010). It has also been suggested that even if a tax on a particular food is ineffective at reducing consumption of 'unhealthy' foods, the tax revenues that are generated from the tax could be used to fund public information programs and other obesity-reducing strategies (Jacobson and Brownell 2000; Kuchler, Tegene, and Harris 2005; Brownell and Frieden 2009).

An alternative to taxing a particular 'unhealthy' food is subsidizing a food deemed to be 'healthy.' Many nutritionists recommend eating more fruits and vegetables as a weight-control strategy because fruits and vegetables are low-calorie, high-fiber foods that have been found to be more filling and satisfying than low-fiber foods (Tohill 2004). Guthrie (2004) and Lin and Guthrie (2007) argued that policies that make retail fruits and vegetables products cheaper would help reduce obesity by causing consumers to substitute away from more energy-dense foods. Evidence in support of this argument is mixed. While fruit and vegetable subsidies may cause individuals to consume more healthfully, they may also consume more calories not only from fruits and vegetables, but from goods that are complements to fruits and vegetables (Okrent and Alston 2012).

Rather than taxing a food group or product, a tax on a nutrient (i.e., total fat or saturated fat), on an ingredient (e.g. added-sugars), or on the energy content of a food could be used to address obesity. Chouinard et al. (2007) estimated that taxing the fat content of dairy products by 10 percent in the United States would decrease fat consumption but would lead to a reduction in weight by less than one pound per person per year, holding all other determinants of weight constant. They also found that the consumer welfare losses from the fat tax on dairy products would be slightly more than the revenue generated (-\$4.48 billion versus \$4.45 billion) and the tax would be highly regressive. Miao, Beghin and Jensen (2010) reported similar findings for taxing the sugar content of foods.

Okrent and Alston (2012) developed a model of the U.S. farm and food industry expressly designed for analyzing such questions. Key findings from this work are in keeping with

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<sup>5</sup> Information on soda taxes is taken from the Bridging the Gap Program at the University of Illinois at Chicago; available at: <http://www.impactteen.org/obesitystatedata.htm#01>.

economic intuition. Given that obesity is caused by an energy imbalance—an excess of calories consumed over calories expended—a tax on food according to its caloric content is likely to be a relatively efficient instrument (having the lowest total social cost per unit of impact on obesity). Taxes applied to particular nutrients (e.g., taxes on food products based on their sugar content or fat content) are likely to be less efficient than a tax on calories; taxes on particular foods (e.g., caloric beverages or sodas) are likely to be even less efficient. Many such instruments are likely also to be regressive, in the sense that the burden will be borne disproportionately by the poor.

Economic tools like ‘fat taxes’ and ‘thin subsidies’ could be used both to influence consumption habits and raise revenue to offset excessive medical public medical expenditures engendered by obesity. Small taxes and subsidies have been found to have little effect on the consumption of categories of foods deemed ‘unhealthy’ and the overall caloric content of foods. Even if such taxes or subsidies were enacted, at what level of the food processing chain should they be applied? Would a subsidy for research and development into farm production of fruits and vegetables lower the price of those commodities and thereby encourage substitution from unhealthy foods to ‘healthy’ foods? Or would a tax on fast food be more effective?

#### 4.2 Changes to farm subsidies or the emphasis of agricultural R&D

Many people blame federal farm subsidies for the current obesity problems (e.g., Pollan 2003, 2007, 2008). It may seem obvious that subsidies must make certain foods cheaper, therefore contributing to overconsumption, but U.S. farm policies have had generally modest and mixed effects on prices and quantities of farm commodities. The overall effect on the prices paid by U.S. consumers for food has been negligible and, consequently, eliminating farm policies would have a tiny influence on dietary patterns and obesity (Alston, Sumner and Vosti 2008; Miller and Coble 2008; Alston, Rickard and Okrent 2010; Rickard, Okrent, and Alston 2012). U.S. farm policies might well be seen as unfair and inefficient. But whether we like these policies or not for other reasons, their effects on obesity are negligible. In fact, eliminating all farm subsidies, including those provided indirectly by trade barriers, may, if anything, lead to an *increase* in annual per capita consumption of calories and an increase in body weight.<sup>6</sup>

In contrast, agricultural R&D has had substantial impact on the abundance and relative prices of farm food commodities. Since 1949, the overall price of farm commodities in the United States has fallen by over 60 percent relative to the GDP deflator. This decline in the real prices of food commodities is attributable largely to agricultural productivity growth, mostly due to agricultural R&D, a significant share of which was funded (and in some cases performed) by the U.S. government, mainly through the USDA. If cheap and abundant food has contributed to obesity, then R&D from the USDA is partly to blame. Does this mean the USDA should have done less research or different research? The evidence from studies of

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<sup>6</sup> Similar results have been found for the case of sugar policy in the European Union. The EU uses a combination of price floors, import duties, export subsidies and quotas to support domestic sugar farmers. The elimination of these policies would reduce the price of sugar by 36% over a 4-year period. Bonnet and Requillart (2010) found that this 36% reduction in price in France would increase consumption of regular soft drinks by 1 liter per year per person and the consumption of added sugar by 124 grams per person per year. See, also, Schmidhuber (2004).



the returns to research indicates that the United States has persistently underinvested in agricultural R&D. Marginal benefit-cost ratios in the range of 20:1 and higher indicate that the extent of the underinvestment has been significant (e.g., see Alston, Andersen, James, and Pardey 2010). These measures did not account for the contributions of agricultural R&D to the social cost of obesity, but it does not seem likely that taking those costs into account would change the picture appreciably. Nor does it seem likely that taking the impacts on costs of obesity into account would imply a significant change in the emphasis of the national benefit-maximizing research portfolio, to increase the share of funding going to research on specialty crops (e.g., see Alston and Pardey 2008). It is likely that better-targeted instruments can be found for reducing social costs of obesity, rather than reducing support for agricultural R&D generally (which is already underfunded) or sharply changing the mix to reduce research on commodities such as livestock and grains in favor of 'healthy' foods like fruits and vegetables (a change that might substantially reduce the returns to the portfolio as a whole without much appreciable impact on obesity). But the precise terms of this tradeoff are not clear and further work is needed before we can make more-specific claims.

#### **4.3 Changes to food and nutrition assistance programs**

With respect to both the FSP and the NSLP discussions have emphasized the role of the cost advantages of foods and ingredients that are relatively energy dense in highly budget-constrained dietary choices. Revisions to the programs have been suggested with a view to disallowing certain types of foods. Meanwhile, the question remains somewhat open as to what is the size of the effect, if any, of program participation on obesity rates, what is the social cost of that effect, which should be charged against the programs, and what adjustments to the programs may be appropriate to reduce those costs and thereby enhance the efficiency of the programs. In light of the observation that many of the poor are also obese, it has been suggested that the FSP could be modified to encourage participants to eat healthier diets. This idea may have been encouraged by findings that the FSP may have contributed to obesity among participants, but does not rest on that possibility.

Under the FSP, participants may redeem their coupons for almost any food items. Some have suggested changing the program to restrict food stamp purchases to exclude certain foods deemed to be 'unhealthy,' e.g., sugar sweetened beverages (Brownell and Frieden 2009; Brownell and Ludwig 2011). Economic analysis (e.g., Guthrie et al. 2007; Alston, Mullally, Sumner, Townsend and Vosti 2009) suggests such restrictions would be ineffective or counterproductive because they would (i) have no impact on food consumption choices by many participants, (ii) would discourage program participation by some others, (iii) if effective in changing consumption choices, would result in relative price changes that would have opposite effects on some groups, and (iv) would increase administrative costs of the program as the food industry would redesign foods to meet the criteria in the restrictions. Another proposal would give coupons greater purchasing power if applied to particular categories of foods (e.g., fresh fruits and vegetables) than others (see Guthrie et al. 2007). Such a modification may be more effective than restricting the list of items eligible for purchase with food stamps, though it would have some of the same drawbacks. Both of these ideas would use a single instrument, the FSP, to pursue two targets: (i) assuring adequate nutrition intakes in populations deemed at risk of under-nutrition (to be achieved by an expanded food budget constraint for the poor); and (ii) reducing the prevalence of



obesity. Modifying the FSP to pursue the second objective would almost surely diminish its effectiveness in relation to the first.<sup>7</sup> Moreover, the problem of obesity is not confined to food stamp participants, and other instruments will be necessary if the government means to address the broader problem. If such other instruments are applied more broadly, it may make less sense to modify the FSP as well.

Congress regularly reauthorizes federal school meal and child nutrition programs. However, the Healthy, Hunger-Free Kids Act of 2010 includes several notable changes in child meal program nutritional standards, access, and funding, as well increased school accountability and monitoring for meal quality. The new legislation provides the largest increase in funding and reimbursement rates for the school lunch program in decades, makes it easier for qualified children to receive free school meals, extends after-school meals to more at-risk children, and provides additional technical assistance to local school food-service providers. The Healthy, Hunger-Free Kids Act will increase access by improving and simplifying application procedures and expanding universal eligibility in high-poverty neighborhoods.

The legislation also allows for the elimination of soda and other junk foods from schools nationwide. The USDA Food and Nutrition Service proposed new Nutrition Standards for the NSLP and SBP in mid-January 2011.<sup>8</sup> The recommended changes to NSLP and SBP nutrition standards include increased servings of fruits, vegetables, and whole grains, a ban on trans fat, and reduced sodium content, as well as, for the first time ever, a maximum allowable calorie content per meal (the nutrition standards already include a calorie minimum). The Healthy, Hunger-Free Kids Act also raises nutritional standards for child-care centers participating in the Child and Adult Care Food Program, and provides funding for training, technical assistance and tools to assist child-care providers in complying with new standards and promoting better nutrition wellness among young children.

#### 4.4 Changes to nutrition and health education

Several studies have found that differences in health knowledge account for some variation in current obesity rates and that the introduction of nutrition labels has been somewhat effective in changing the food consumption patterns of individuals. However, strategies aiming to improve the state of nutrition knowledge of individuals (e.g., nutrition education programs and food labelling regulations) have been relatively ineffective, and policymakers have suggested several changes.

Since the 1990 enactment of NLEA, the FDA has required packaged foods to list the amounts of various nutrients per serving along with a definition of serving size. This requirement has had some effects on consumer purchasing behavior but the actual use of the labels is much less than what is typically reported, fewer consumers are using the labels than in the past, and labels often leave shoppers confused and misinformed (Cowburn and

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<sup>7</sup> Conversely, some would favor expanding the scope of the FSP to include among the eligible purchases food away from home, including fast food, at least for certain groups in society (such as homeless) as a way of better achieving its primary purpose of providing a food income safety net. Such a proposal was debated in the New York Times <http://www.nytimes.com/roomfordebate/2011/09/27/expand-the-use-of-food-stamps?nl=todaysheadlines&emc=thab1>

<sup>8</sup> The complete list of proposed nutrition standards is available at: <http://www.fns.usda.gov/cnd/governance/regulations/2011-01-13.pdf>.

Stockley 2005; Todd and Variyam 2008). New forms of food labeling, and front-of-the package nutrient postings have been cited as potential tools for improving the nutrition of the population (Nestle and Jacobson 2000). In particular, many developed countries have begun to investigate whether 'traffic-light' nutrition labels with symbols on packages that indicate high, medium or low levels of a few specific nutrients or energy will help consumers make more healthful food choices. The evidence of whether traffic-light labels work is mixed. First, most of the front-of-the-package labeling has been self-regulated by the food industry – the 'Smart Choices' program in the United States, the 'Choices' logo in the Netherlands, and the 'Multiple Traffic Light' in the United Kingdom. Roberto et al. (2011) found that 60 percent of the foods that had the 'Smart Choices' label did not meet standard nutritional criteria for a healthy food based on the Nutrient Profile Model (a non-industry-developed and validated national standard).

Second, even though most of these programs have been found to help consumers identify which foods are healthy, very little evidence is available on whether the programs actually caused consumers to purchase healthier foods (Grunert and Wills 2007). Garson and Engelhard (2007) found that sales of foods in vending machines at the University of Virginia labeled with a red light (i.e., highest in fat and calories) decreased 5.3 percent, while those labeled with a yellow light or green light increased by 30.7 and 16.5 percent, respectively. Similarly, Vyth et al. (2010) found some support for the claim that the Choices logo motivated healthy food choices in the Netherlands. Alternatively, Sacks, Rayner and Swinburn (2009) found little evidence that the introduction of the Multiple Traffic Light labels in the United Kingdom on ready meals and sandwiches had any impact on the relative healthfulness of consumer purchases. Hence, even if the new labels clarify whether a food is healthy, it is not clear the consumers will be induced by the information to change behavior and eat less calories.

The Healthy, Hunger-Free Kids Act establishes important reforms for the national food stamp nutrition education program (SNAP-Ed), expanding the program's focus to include obesity prevention and allowing the use of community and public health approaches to improve the diets of low-income families with the Nutrition Education and Obesity Prevention Grant Program. The provision requires that nutrition education activities be evidence-based and focused on specific nutrition or health outcomes. It also requires that schools that participate in the NSLP or SBP implement a 'school wellness plan,' with physical activity and nutrition education goals, plus nutrition guidelines for foods available on campus, by the 2011-12 school year.

#### 4.5 Food marketing regulations

When parental supervision declines at home, children are left vulnerable to environmental stimuli that can affect consumption patterns. For example, food marketers target the youth demographic by advertising during periods of the day when children watch television, which could induce children to choose less-healthy, but heavily advertised foods. Rashad, Grossman and Chou (2005) explained that a brand's advertising acts as a complementary good such that consumers derive more utility from consuming a more-advertised good. For example, a child may value the toys associated with commercials more than a toy that is not advertised. Their results show a strong positive effect of exposure to fast-food restaurant advertising on the BMI for children and adolescents; a complete ban on fast-food television advertising during children's programming hours would reduce the number of overweight children and adolescents by 10 percent and 12 percent, respectively.

The Omnibus Reconciliation Act of 2009 called on the Federal Trade Commission, the USDA, the Centers for Disease Control and Prevention (CDC), and the FDA to jointly create the Interagency Working Group on Food Marketed to Children (Working Group) and produce a set of standards for the advertising of foods to children and adolescents. In April 2011 the Working Group released for public comment a set of proposed industry guidelines for self-regulation. The Working Group proposed two main nutrition principles, labeled principles A and B, that foods marketed to children should meet, as well as a definition of “marketing targeted at children and adolescents.” Nutrition principle A indicates that food products marketed predominantly to children (ages 2–17) should “make a meaningful contribution to a healthful diet.” Nutrition principle B calls on the industry to develop and reformulate food products marketed predominantly to children and adolescents to minimize the proportion of nutrients that could have unwanted effects on body weight (e.g., added sugars, salt, and trans fats) or health of children. Lastly, the Working Group adopted the FTC definition of “marketing targeted at children and adolescents” (ages 2–17), and requested that the industry adhere to the Nutrition Principles in 20 different categories of targeted advertising and promotional activities including movies, video games, magazines, and specific websites based on the share of the audience represented by children (Interagency Working Group 2011).

## 5. Conclusion

Government intervention in the food industry with the aim of reducing the incidence of obesity can be justified, economically, if obesity entails externalities and if the benefits from the intervention exceed the costs. Food policy is a second-best obesity policy, but some of the policies considered in this chapter could pass this benefit-cost test, given that first-best policies are not feasible. Various policies have been proposed that would counter obesity by making relatively unhealthy foods relatively expensive. Some of the policies that are commonly discussed would be ineffective or inefficient. These include (i) limiting food stamps to only healthy foods, (ii) taxing foods according to their fat or sugar content, (iii) taxing caloric beverages, (iv) eliminating farm subsidies, or (v) reducing funding for agricultural R&D. Most of these policies would be ineffective relative to the objective of reducing obesity, and may be counterproductive relative to the safety-net purpose in that almost any such policy is likely to be regressive, falling disproportionately heavily on the poor. All of these policies would be inefficient in the sense that other policies could be devised that would have the same benefit (in terms of impact on obesity) at lower social cost.

A relatively efficient policy would be to tax foods according to their individual caloric content, but this policy too might not be very effective unless accompanied by other instruments directed towards other elements of this very complex social problem. A combination of incentives through tax and subsidy policies, selective regulation, and educational programs seems likely to be more efficient than taxes alone. And the design of such policies bears careful consideration and analysis. Discussions of obesity tax policies tend to emphasize the demand side—taking the food product choices as given, and focusing on the use of incentives for consumers to choose differently from among the given choices. But given the large and increasing role of prepared foods and food away from home, the supply side may offer greater scope for substitution away from energy-dense foods, through innovations in food processing and manufacturing. Hence, in designing any such policy it is desirable to have in mind the potential impact on the food industry, through incentives to

innovate in manufacturing and produce and promote consumption of foods that are attractive to consumers while having socially desirable nutritional characteristics. Calorie taxes could be introduced based on economic efficiency alone, but they might be based partly on paternalism, which is a potentially dangerous policy path. On the other hand, FANPs themselves are paternalistic, and it seems perfectly reasonable to require that FANPs do not encourage the poor or their children to eat unhealthy foods. This argument implies a basis for adapting the programs that provide specific foods (such as WIC, NSLP, SBP) and eliminating junk foods from schools, as entailed under the Health, Hunger-Free Kids Act of 2010. It is less useful relative to the SNAP program given its generic purpose as a food safety net.

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Human behavior accounts for the majority of morbidity and premature mortality throughout the world. This book explores several areas of human behavior including physical activity, nutrition and food, addictive substances, gun violence, sexual transmitted diseases and more. Several cutting edge methods are also examined including empowering nurses, community based participatory research and nature therapy. Less well known public health topics including human trafficking, tuberculosis control in prisons and public health issues in the deaf community are also covered. The authors come from around the world to describe issues that are both of local and worldwide importance to protect and preserve the health of populations. This book demonstrates the scope and some of the solutions to addressing today's most pressing public health issues.

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