

THE SKINNY ON A FAT TAX: OBESITY AND MICROECONOMICS

By Lisa M. Southworth

Abstract: The growing problem of obesity in the U.S. has prompted calls for government action, including the imposition of a "fat tax." The author uses microeconomic theory and a cost-benefit framework to explore the pros and cons of a fat tax. She applies theories of rational and irrational consumer decision-making to obesity-related consumption decisions and presents a simple supply and demand model to suggest the likely consequences of a fat tax. The author concludes that, before implementing a fat tax, additional research is needed to determine if a fat tax is merely the latest fad or a significant policy initiative that will make real contributions to correcting a major health problem in the United States.

INTRODUCTION

Obesity is not only a growing health problem in the U.S. but also a growing financial problem and many are calling for the government to implement a policy to curb its costs. Some advocates have pointed to the idea of a "fat tax" as a viable governmental response (Jacobson and Brownell 2000). Similar policies have been gaining ground in several states and internationally but very little adequate economic analysis has been completed in order to understand the possible ramifications. Discussing this policy concept in a cost-benefit framework will assist in exploring the possible consequences of such a tax and in developing suggestions for future research.

In this paper, I use microeconomic theory and a cost-benefit framework to discuss the pros and cons of a fat tax as a way to curb the problem of societal

obesity. Some of the issues discussed include policy context, consumer consumption decisions, government intervention, stakeholders and standing, a supply and demand model, benefits and costs, and equity issues—and these all hint at the magnitude of additional research needed. I conclude that, while obesity is a real problem that may call for federal action, more analysis is necessary before advocates and policymakers rush to support a fat tax as a desirable solution.

POLICY CONTEXT: THE PROBLEM OF OBESITY

Obesity¹ is an increasing problem in the U.S. as well as internationally because of obesity's effect on a person's overall health. Among adults aged 20—74 years, obesity has nearly doubled from approximately 15 percent in 1980 to an estimated 27 percent in 1999 (U.S. Department of Health and Human Services 2003). Also, in 1999, 13 percent of children aged 6—11 years and 14 percent of adolescents aged 12—19 years were overweight, which is defined as a BMI between 25 and 30. Being overweight increases risk factors for obesity-related diseases. The 2001 Surgeon General's report states that overweight adolescents have a 70 percent chance of becoming overweight or obese adults (U.S. Department of Health and Human Services 2001). These increases in overweight and obesity cut across ages, racial and ethnic groups, and genders.

In the U.S., such drastic increases in obesity signal not only a health crisis but a financial crisis as well.

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In 2000, the economic costs attributed to obesity were estimated to be \$117 billion per year. Obesity-related deaths have been estimated at 300,000 per year (U.S. Department of Health and Human Services 2001). These costs include both direct costs, like medical expenditures, and indirect costs, like lost productivity and wages. These costs are higher than the economic costs associated with tobacco use (Kuchler and Ballenger 2002) and raise the question of what, if anything, the government should do about what the media likes to call a national obesity epidemic. Medicare and Medicaid may be financing half of the burden of direct obesity-related costs at a toll of approximately \$13.5 to \$24.5 billion in 1998 (Finkelstein, Fiebelkorn, and Wang 2003). Clearly, the U.S. government, our society, and individuals themselves have a stake in trying to address these trends.

POLICY CONTEXT: POSSIBLE CAUSES OF OBESITY

There are many theories that explain obesity as well as its dramatic increase. Studies point to increased availability and low prices of fast food and other processed food, increased soda and candy consumption, and increased advertising of unhealthy foods to children. One of the most convincing stories is that of technological advances that turned active workers into sedentary workers, brought lower prices, and increased the demand for processed food. The increases in the availability and consumption of processed food items are partly due to the cost savings associated with such convenience items (Philipson and Posner 1999; Lakdawalla and Philipson 2002).

With these technological changes and a lower need for a physically active work force, exercise is now done primarily during leisure time. The increased availability and use of TVs, computers, and video games during leisure time have caused a corresponding decrease in exercise, with many people choosing a level of exercise that is inadequate for the amount of calories consumed.

In addition to excessive calorie consumption and inadequate physical exercise, there are other factors that contribute to America's growing obesity. It is likely that a combination of genetic, metabolic, behavioral, environmental, cultural, and socioeconomic influences are at work (U.S. Department of Health and Human

Services 2001). Also, consumers may lack full information about the food they eat, which could explain various Food and Drug Administration (FDA) labeling laws regarding nutritional content. Perhaps, with full information, fully rational consumers would make different choices.

TAX PROPOSALS TARGETING OBESITY HAVE WIDE SUPPORT

A tax would be one of the easiest policies to implement in order to curb obesity, since the infrastructure already exists to collect and enforce such a tax. Also, raising prices of unhealthy foods in order to curb calorie consumption is a less intrusive form of government intervention than trying to intervene in the more personal causes of obesity, such as the genetic, metabolic, behavioral, environmental, cultural, and socioeconomic factors that are likely contributors to obesity. Two prominent health advocates who have been advocating a fat tax, or something similar, as a way to address the obesity problem are Kelly D. Brownell and Michael F. Jacobson. Brownell is professor and chair of the Department of Psychology and professor of epidemiology and public health at Yale University and director of the Yale Center for Eating and Weight Disorders. Jacobson is the executive director of the Center for Science in the Public Interest (Jacobson and Brownell 2000).

In addition to domestic advocates, international organizations are starting to release statements in favor of such tax policies. On its Web site, the World Health Organization has released a draft of its "Global Strategy on Diet, Physical Activity, and Health," a resolution that encourages the use of pricing policies, including taxes, to influence consumption decisions in order to promote healthier foods (World Health Organization 2003). Recent newspaper articles in England's *The Daily Telegraph*, *The Irish Times*, New Zealand's *The Press*, *The Toronto Star*, and Australia's *The Advertiser* discuss fat taxes that have been proposed recently in these countries. Several U.S. states have also recently proposed taxes aimed at curbing obesity, particularly in children. For example, an August 10, 2003, article in *The Washington Post* discusses recent efforts by states to legislate against obesity. One example is that the New York State

legislature was asked to consider a proposal to tax junk food, video games, and certain types of advertising.

PROPOSED POLICY: DEFINITION OF FAT TAX

There is no standard definition of a fat tax. Some proposals seek to tax by categories of food regarded as unhealthy—fast food, baked goods, soda, candy, snack food, and so on. Other proposals would tax individual foods determined to be unhealthy on the basis of their fat or caloric content. In order to have a high probability of achieving the desired effect on obesity, it would make sense to decide which foods are contributing to obesity and to tax all of them. This would rule out any substitutions that consumers could make between, for example, donuts and potato chips. It would also decrease the chance that companies would decrease production of a taxed food product and increase production of an untaxed but still unhealthy food product.

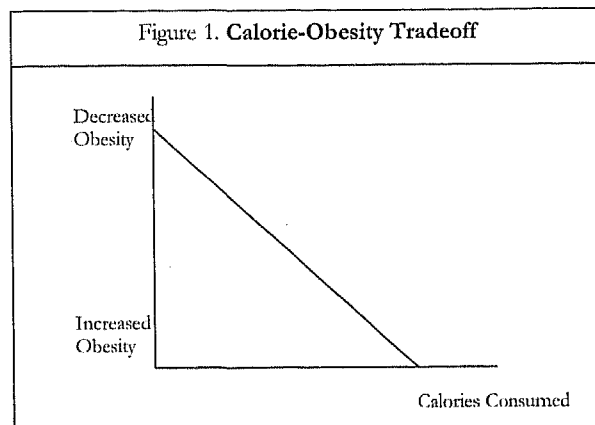
An additional benefit of a broad tax base that would include all unhealthy foods, or ones that are shown to strongly contribute to obesity-related medical costs, is that it would not unfairly target one type of producer over another. For example, candy bar companies and soda companies would both be affected. Increased costs and changes in production and demand would affect all companies whose products contribute to the national costs of obesity. Since a broad tax base is desirable in this area, the definition of a fat tax, for the purposes of this paper, is a tax that is applied to all food or beverage items that contribute to obesity.

CONSUMER CONSUMPTION DECISIONS

The Tradeoff

In order to construct a simple model, I focus on excess calorie consumption as the main cause of obesity. Of all the possible causes of obesity discussed previously, this is the least intrusive cause of obesity to regulate and, hopefully, the easiest to change. When consumers make a decision about the amount of calories they are going to eat, they make a tradeoff between calories consumed and body weight, or level of obesity. The greater the number of calories consumed, the greater the individual's body weight. In Figure 1, this tradeoff is illustrated with an x-axis

of increasing calories and a y-axis of decreasing obesity.



More calories consumed lead to greater total body weight, a higher BMI, and higher obesity. If a consumer chooses to eat an excessive amount of unhealthy food, for example, he or she may also be choosing a higher body weight and BMI. But is this consumer choosing rationally or irrationally? And what implications could rationality or irrationality have for a fat tax proposal? Before we implement a fat tax whose objective is to decrease consumption of unhealthy food, we need to explore these questions.

The Rational Consumer

A traditional economic consumer choice model typically assumes that consumers make their decisions rationally—that is, that consumers have ordered preferences and make decisions accordingly. It is assumed that a consumer has a preference for a specific mix of calorie consumption and body weight and that the consumer makes decisions in accordance with that preference. If a person is overweight or obese, it is the result of a rational decision to value excess calorie consumption over a lower body weight even after taking into consideration things like future health effects and cost savings. A person's BMI, regardless of its clinical category, corresponds to the ideal weight for a consumer because it represents a rational decision based on his or her preferences.

Goldfarb, Leonard, and Suranovic see seemingly inconsistent consumer behavior as a series of rational

decisions. A person may be clinically obese or overweight and repeatedly decide to diet due to several rational decisions made in response to different motivating factors or events. Their model allows for “optimal overweightedness”, where the individual’s choice for an ideal weight tends to be higher than the medically ideal weight (forthcoming). This model shares some similarities with the model of rational addiction, in which rationality means a consistent plan to maximize utility over time. If eating unhealthy food were like a rational addiction, past consumption would have a large impact on current consumption and deviations could be explained in this context by looking at binges and rapid falls in consumption. This comparison would also indicate that addicts would respond more to permanent price changes than to temporary ones (Becker and Murphy 1988). These models claim that inconsistent and addictive behaviors are explained through rationality. But is this realistic? Are all consumers fully rational in their dietary decisions, or is it possible that some consumers have self-control problems and make impulsive decisions that they later regret?

The Irrational Consumer

Some economists argue against this rational model in some situations, particularly in the case of retirement savings, and their theories may be relevant to the obesity problem. When a consumer states that he or she would like to weigh less in the future and chooses to diet, but then decides to eat french fries, this does not appear to be a rational decision. Consumer decisions that seem difficult to explain rationally have been examined by studies of anomalies in intertemporal choice (Loewenstein and Thaler 1989). These anomalies are a factor in models of consumer behavior in which a consumer is biased toward the present with an unusually high discount rate or is time-inconsistent. These models then look at the differing effects of these choices on naïve and sophisticated consumers.

Consumers who consume excess calories are operating as naïfs that receive immediate payoffs for consuming now and, as with an addictive activity, incur future costs (Rabin and O’Donoghue 1999). When making food consumption decisions, not all consumers are acting rationally. Some make decisions impulsively that they will later regret, because the decisions do

not match their preferences. Most people who are obese would rather be thin, when given the choice (Bray 1986). However, for whatever reason, a consumer may put greater value on a bag of potato chips now instead of on later health effects.

Does Rationality Matter?

We may not be able to conclude that all consumers make only rational choices or irrational choices. It is an issue that should be carefully considered, however. Consumer rationality affects dietary decision-making processes, which have an impact on weight and obesity. If consumers are fully rational, they are more likely to react to a fat tax in a way that can be easily predicted by a consumer choice model. If the price of high-fat food is raised, the quantity demanded and consumed will decrease. Of course, this strict version of rationality does not accommodate rational addiction or a consumer-determined optimal weight that can include a rational choice to be overweight or obese. A broader definition of rational consumption encompasses those consumers who do not decrease their demand in response to a fat tax because they prefer to continue purchasing fatty snacks at the expense of other goods.

If consumers capable of irrational choice respond to a fat tax at all, the impact on demand and consumption could be less than that of rational consumers. This is because a tax is an incentive to change behavior that relies on an assumption of consumer rationality. If that assumption is violated, then behavior will not necessarily change. Since the world is often messier than economic models, both types of consumers, rational and irrational, exist in the marketplace. This should be considered when proposing a policy solution like a fat tax since all consumers—even if totally rational—could be pursuing their own self-determined ideal body weights instead of the ideal weights as defined by the medical community.

GOVERNMENT INTERVENTION

People who believe that the government should not interfere with personal decisions object to proposals that try to alter behavior. However, in the case of obesity, whether or not consumers are fully rational, the government is justified in intervening in

some way. If not all consumers are making fully rational decisions, no amount of FDA regulation of nutrition labels or access to additional dietary information will result in perfectly rational decision-making by everyone. If consumers are struggling with self-control issues when making food consumption decisions, it may be appropriate to move cautiously toward helpful regulation even if it is paternalistic. Despite this word's negative connotations, there are sound arguments for moving toward a policy that would assist consumers in sticking with their long-term preferences over the temptation of immediate consumption rewards. Such a move could be in agreement with "optimal paternalism" (O'Donoghue and Rabin 2003), "asymmetric paternalism" or "regulation for conservatives" (Camerer et al. 2003), or "libertarian paternalism" (Sunstein and Thaler 2003). It should be possible to increase the welfare of irrational consumers while inflicting no harm, or minimal harm, on fully rational consumers.

If rational consumers are acting as though they are addicted to unhealthy high-calorie food or are choosing levels of body weight that are higher than recommended by health experts, we may want to consider similarities between snack food consumption and tobacco use. Obviously, there are important differences but tobacco has been somewhat successfully regulated through sin taxes with the explicit goal of reducing consumer use and, therefore, tobacco-related health costs. Some evidence even suggests that smokers have been made better off by cigarette taxes because they have actually increased their welfare. This is due to the addictive nature of the taxed good (Gruber and Mullainathan 2002).

Unhealthy food such as potato chips may not be addictive in the same clinical sense that tobacco is but studies show patterns of consumption, monopoly price effects, and brand loyalty (Becker, Grossman, and Murphy 1994) similar to that of cigarette consumers. A policy similar to the one used to regulate tobacco might decrease unhealthy food consumption and lead to lower obesity-related costs for the government and society. If the rationality of consumers is inconclusive or unhealthy foods show no similarity to addictive goods, the nation's high rate of obesity and related medical costs could itself be a negative externality with enough national impact that the government

would be justified in trying to change consumer behavior. It could be the government's place to intervene and implement a tax or even some sort of regulatory policy in order to promote changes in consumption. This problem greatly affects the federal government, if for no other reason than that the federal government heavily subsidizes obesity-related health care expenses.

STAKEHOLDERS AND STANDING

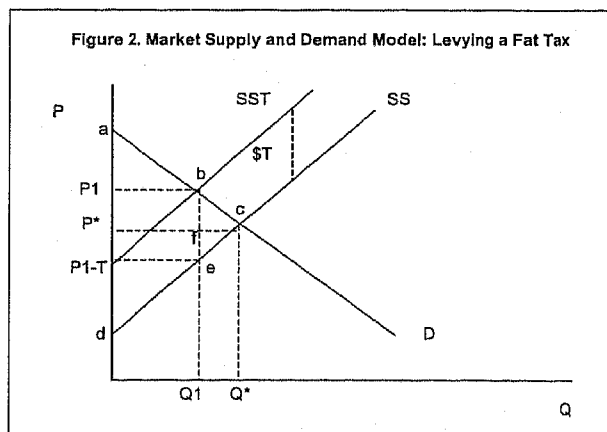
In considering the effects that such a tax would have in terms of potential costs and benefits, I consider the societal perspective where the U.S. government and its residents have standing. I consider residents, rather than taxpayers, since anyone who lives in the United States may bear the burden of obesity costs or see lower benefits for goods or services that are publicly available. However, most of the costs are likely to be borne by taxpayers. If all of society has standing, the results of a fat tax would need to be considered from the perspective of each stakeholder in order to gain an understanding of what kinds of costs, benefits, and transfers might occur. Those who have standing in the analysis would then include individual consumers, private firms, such as those that produce items that would be taxed, insurance companies, private health insurance companies and hospitals, medical organizations, and the federal government.

Since the issue of obesity affects the welfare of all these groups, it stands to reason that they would also be affected by a tax that attempts to curb obesity. It is possible that private companies that produce the items that would be taxed would lobby vigorously against such a tax and that health advocates and organizations would see a benefit in the tax. Consumers would likely be both for and against such a tax based on their perception of its effect on them as individuals and as a group as well as how they value the changes resulting from the tax versus the status quo. The government would see benefits in increased revenue that could help to offset obesity-related costs, although there would be ideological arguments for and against the tax as well. These all point to the question of whether or not a fat tax is politically feasible, which is an important consideration.

SUPPLY AND DEMAND MODEL

In order to understand the effect that a fat tax would have, it is useful to consider a simple supply and demand model, as presented in Figure 2. A tax on unhealthy items would be levied on the producer but would be paid at least in part by the consumer because the producer would incorporate the tax into the price. The amount paid by the consumer depends on the breadth of items taxed and the elasticity of demand for consumers as well as the availability of substitutes. If only potato chips were taxed, companies would be unable to pass the tax on to consumers because of the range of substitutes left untaxed. In this model, the current price and quantity are assumed to be set by a competitive market even though there are companies that could be considered monopolies. Such a tax could be imposed with the intent to change behavior but it could also be imposed to correct for a negative externality such as obesity-related medical costs. If a negative externality such as medical costs is considered in designing a solution, a tax could internalize the negative externality. In the case of an externality, a tax would move price and quantity closer to the true equilibrium by pricing in the externality. Ideally, the tax would eliminate the deadweight loss and result in a net social benefit. However, if medical costs and other factors are priced at the current market equilibrium, a tax would create a deadweight loss and result in a net social loss.

For the sake of simplicity, I assume that the supply and demand curves in Figure 2 are linear, that this is a competitive market, and that there are no externalities



or that any possible externalities are captured in the market price. P^* and Q^* are the current price and quantity, which are assumed to be at market equilibrium where supply equals demand. Were the tax implemented, the supply curve would make a parallel shift from SS to SST . The tax, $\$T$, would be incorporated into the price by the sellers, so consumers would see a new supply curve, SST . The new price seen by consumers would be $P1$ and the sellers would receive a net price, $P1-T$. The equilibrium point would move from point c to point b . Table 1 illustrates the net social cost (with no consideration of externalities).

Table 1. Net Social Cost

Net Social Cost	Costs	Benefits
Producers	$P^*(P1-T)ce$	
Consumers	P^*P1bc	
Tax Revenue		$P1(P1-T)be$
Net Social Cost = DWL	bce	

Since the losses in producer surplus and consumer surplus would be offset by the gain in government revenue, the net social cost would be the deadweight loss associated with the tax. With estimates of the demand and supply elasticities, along with a point estimate of the current equilibrium, the deadweight loss and changes in consumption as a result of the price change due to the tax could be estimated. In order to use the model outlined above, values for demand and supply price elasticity would need to be estimated for unhealthy food items - in addition to any applicable amount of shift in the social cost curve due to a negative externality. Most food demand elasticities, as estimated by the U.S. Department of Agriculture (USDA) and other sources, have an absolute value less than one. However, in the case of unhealthy foods, it is reasonable to think that supply and demand would be more elastic. On the other hand, it is questionable that demand would be sufficiently elastic to impact consumption enough to see greater benefits than costs from a fat tax. Affected companies should be fairly responsive to price, since they could either shift production to other goods or export the items they could not sell in the U.S. Estimating the supply and demand curves with elasticity and point estimates would allow us to calculate the possible

effects of a fat tax in terms of the supply and demand model depicted in Figure 2. This is an area that needs further research before a fat tax proposal is implemented.

BENEFITS

A fat tax could have the effect of reducing excess calorie consumption and, therefore, body weight. This is typically the stated policy goal of such a proposal: to decrease the prevalence of obesity and related health problems. However, a fat tax could also correct for a negative externality such as higher medical expenditures, lower productivity, or lower wages due to obesity from excess consumption of fat or high-calorie items. Another oft-stated policy goal of such tax proposals is the generation of government revenue to fund obesity educational and/or prevention programs. A fat tax could be seen as beneficial if these programs resulted in health benefits, the value of which exceeded the value of transferred government revenue. However, it is hard to argue that earmarked tax revenue would cause substantial additional change, unless it were to fund a new program that would not have been initiated with general revenue or without the new fat tax. Nonetheless, there would also be substantial intangible benefits for individuals—increased self-image and confidence, among others—and even an argument for increased societal welfare as a result of these individual intangible benefits. There would also be secondary benefits in the increased sale of healthier goods like vegetables, which consumers would substitute for the taxed items. If the policy is too narrow and does not tax a range of unhealthy items, benefits would be minimal because of the large scope of substitute goods.

With the aforementioned lack of quantitative information, it is difficult to estimate and monetize the benefits of a fat tax. Would the social benefits from this tax be enough to outweigh the costs? Whether people reduce their body weight through a new government program funded by the fat tax revenue or simply on their own by eating healthier food, we would need to determine that the weight reduction would not have occurred without the implementation of a fat tax. If an obese person aged 35—64 years loses 10 percent of his or her body weight and successfully keeps it off, fairly large medical cost savings would be

achieved. These would include a reduction in lifetime medical costs of obesity of \$2,523 to \$6,077 per person in 2002 dollars (Oster et al. 1999), converted from 1996 dollars with the Consumer Price Index (CPI). Even if people failed to achieve full benefits immediately or gained back the lost weight, these cost savings would be great enough that we would not want to ignore them. It is possible that finding an effective way for the government to intervene would pass a cost-benefit test.

COSTS

Any time a tax is instituted, we can expect to incur a deadweight loss (DWL). If the DWL were the only cost to society of instituting this tax, we would need to see net benefits greater than the DWL in order for such a tax to be justified by the cost-benefit principle. It could be argued that the main driver of the magnitude of benefits would be the proportion of obese or overweight people who manage to keep weight off and achieve the full benefits predicted by Oster and his co-authors. There could be administrative costs due to collecting the tax, but these would probably be relatively small—possibly even negligible—since an infrastructure already exists for collecting sales taxes. There could be additional social service and private costs associated with any decrease in mortality that would occur as a result of the tax. Producers could face additional costs in order to maintain low costs under the additional price pressure such a tax would bring.

There would also be intangible costs, such as the welfare loss suffered by people who would experience a loss in freedom of choice simply by knowing that another sin tax was in place. If the fat tax resulted in significant weight loss by many people, a secondary loss to the diet or tobacco industries could result, since both industries are often used for weight control. There is even some evidence that the health costs caused by a rise in obesity would be offset by the value of the accompanying time-savings (Cutler, Glaeser, and Shapiro 2003), so any loss of time-savings would need to be considered as well. Many of the costs and benefits would net out in the final analysis as transfers, but it is important to consider them individually in order to understand who would win and who would lose in the wake of a fat tax.

ON EQUITY

Targeting more than one category of unhealthy food would appear to be an effective way to change behavior but it would raise some problems. The tax would probably be more regressive if it were to tax a broader spectrum of unhealthy food items. For example, if we taxed fast food, low-income consumers would probably be forced to shift to an option that would be even more dangerous to health than fast food consumption. Since fast food is inexpensive and convenient, it could be difficult for those on limited budgets to replace that option. If taxes were levied on several categories of food, subsidies would need to be implemented for healthier foods in order to make up for budgetary and convenience factors.

If the fat tax were implemented as a unit tax—a tax per gram of fat, for example—it would be like tobacco or alcohol taxes. Such unit taxes are typically discriminatory to lower priced goods. A larger percentage of the net price of lower priced goods is accounted for by the tax than higher priced goods. Lower priced goods also tend to be lower quality goods. If it is true that people with lower incomes would buy lower priced goods, a per-unit tax would be regressive because people with lower incomes would probably pay a greater percentage of their income and of their purchase in the tax than a higher income person. Those with the least ability to pay would probably be paying a greater proportion of their income in the tax.

Another equity concern lies in the impact on individual consumers. Rational consumers, whether they choose to shift away from consuming unhealthy foods or to continue consuming them, face a change in choices essentially driven by budget constraints. If rational consumers who were overweight or obese chose to continue consuming excess unhealthy food and maintaining higher body weights, they would face higher prices. If the tax were high enough, they could even lose the option of maintaining their high weight. Would it be fair for the government to force them to lose weight against their will? If consumers were irrational, a tax would probably help them adhere to their true preferences and avoid addictive or inconsistent consumption behavior. It seems unlikely, however, that all or most consumers would need the government to intervene.

CONCLUSION

We need to be able to compare estimates of costs and benefits in order to understand if a fat tax should be considered; accordingly, more research is needed to achieve estimates for the costs and benefits and to resolve the ambiguity of a fat tax's implications. Additional research might disclose that such a tax might not effectively change consumer behavior in a meaningful way. Furthermore, the resulting costs and benefits of a fat tax would be dependent on many factors. Any policy whose stated goal is to reduce obesity and its associated costs would need to address how consumption decisions that affect weight are made and how a change in behavior associated with those decisions could be induced.

Additionally, a fat tax policy will have to address the fact that a temporary change in behavior may not reap benefits in the long term. In short, we do not have enough information about how consumers make consumption decisions and pursuing a fat tax policy without such information would be unwise. I suggest that a tax be considered one element in a larger strategic plan that would include education, prevention, subsidies for healthy food, and even regulations regarding portion sizes. Consideration should be given to applying the tax revenue generated by a fat tax to programs that would reinforce and encourage healthier food choices. But before any such policy is implemented, it is clear that we need a greater understanding as to what really causes or motivates the decisions that result in obesity, what types of food items really contribute to the problem, what effects can be expected from such a tax, and the magnitude of those costs and benefits.

NOTES

¹ Obesity is typically defined as having a Body Mass Index (BMI) of 30 or above. BMI is calculated by dividing weight by height: $BMI = [\text{weight (lbs)} \times 703] / [\text{height (in)}^2]$. A person who is 6'2" and 230 pounds would have a BMI of about 30.

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