

Economics of Nutrition

Marianne Bitler, UC Irvine and NBER and Parke Wilde, Tufts

1. Introduction

The close relationship between economics and nutrition runs in two directions.

- First, nutrition influences economic conditions. Economic historian Robert Fogel has argued that improved nutrition was a decisive factor for improved health and successful economic development in Europe and the United States during the 19th and 20th Centuries (Fogel, 2004). More recently, rising rates of obesity have affected rates of chronic disease in developed countries, raising health care costs.¹
- Second, economic conditions influence nutrition. Prices and incomes are leading determinants of food choices, dietary quality, and household food security (Okrent and Alston, 2011).

This chapter addresses selected aspects of the economics of nutrition in developed countries.² Developed countries (and some less-developed countries) simultaneously face nutrition problems from both over-consumption and under-consumption.

¹ In the United States, obesity may be responsible for \$147 billion per year in medical costs, about 10 percent of all medical expenditures (Finkelstein et al., 2009). Some economists estimate an even larger effect (Cawley and Meyerhoefer, 2010).

² The economics of nutrition in developing countries are discussed in Chapter **<Please fill in chapter touching on this>**.

Throughout this article, we take the United States as a case study for the developed world, in part because of the easy availability of data.

Four leading causes of death in the United States are influenced by dietary choices: heart disease, cancer, stroke, and diabetes. Increased rates of overweight and obesity in recent decades have been associated with each of these diseases. This has happened at the same time as rates of being overweight or obese among adults have increased from half of men and 40% of women in the early 1960s to nearly 3/4ths of men and over 60% of women in the mid- to late 2000s (NCHS, 2011).

Meanwhile, the federal government assesses the extent of food-related hardship in the United States using a survey-based measure of food insecurity, which is defined as not being able to afford sufficient food for an active healthy life for all household members at all times. Based on responses to questions in the Current Population Survey, the U.S. Department of Agriculture (USDA) estimates that 17 million households (or 14.7% of all U.S. households) were food insecure in 2009. In 4.6% of U.S. households in 2009, the survey respondent reported experiencing hunger at some point during that year (Nord et al., 2010).

This chapter focuses on economic principles and research that are useful for understanding policy decisions about nutrition issues. Section 2 describes how prices, income, and other factors may affect nutrition. Section 3 summarizes economic as well as commonly applied non-economic perspectives on policy options to address nutrition concerns. The remaining sections review real-world applications related to four leading categories of policy responses to nutrition concerns: Section 4 discusses food assistance programs; Section 5 discusses policies to improve nutrition information; Section 6

discusses taxes and subsidies to guide consumer food choices; Section 7 discusses other government interventions to affect supply; and Section 8 discusses recent insights from behavioral economics regarding policies to nudge consumers in the direction of healthier choices.

2. The Effect of Economic Conditions on Nutrition

As theoretical foundations, economists use both (a) a traditional simple theory of consumer choice and also (b) more elaborate theories that more specifically address health and nutrition issues.

The traditional economic theory of choice suggests that rational consumers seek to purchase a bundle of goods (x_1, x_2, \dots, x_k) that satisfies their preferences (represented by the utility function U) and is feasible, subject to a budget constraint. Because the budget constraint depends on the consumer's income (Y) and the prices of the goods (p_1, p_2, \dots, p_k), the theory suggests that consumer choices respond in a systematic way to prices and incomes. Formally, the consumer solves the choice problem:

$$(1) \quad \text{Max } U(x_1, x_2, \dots, x_k),$$

subject to $p_1 x_1 + p_2 x_2 + \dots + p_k x_k \leq Y.$

For normal goods, if income increases, then the quantity purchased increases. In standard cases, if the price increases, then the quantity purchased decreases. Goods whose consumption amounts tend to rise and fall together (such as peanut butter and jelly) are complements: if the price of a good increases, then the quantity purchased of a complementary good decreases. Other goods (such as beef and pork) are substitutes: if the price of a good increases, then the quantity purchased of a substitute good increases. The responsiveness of these price and income effects is measured using elasticities,

which denote the percentage change in consumption of a food in response to a 1% increase in the explanatory variable.

In studying nutrition issues, economists have in various ways extended the simple traditional theory of choice to take account of the health consequences of food choices. Consider a consumer who must choose goods to purchase and the amount of time to spend on an array of activities (z_1, z_2, \dots, z_k) , including daily hours of sleep, work, watching TV, exercise, grocery shopping, and cooking. Just as there is a budget constraint for total purchases, there is also a time constraint for the total number of hours available in a day. Such extended theories of choice offer insight into nutritionally relevant decisions. For example:

- weight change from one month to the next depends on the amount of food energy consumed and the amount of energy expended on daily activities;
- dietary quality depends in part on how the consumer combines purchased food with time spent in activities (as when a consumer chooses between a fast-food meal and a home-cooked meal);
- the time costs of preparing food may influence consumer choices among restaurant meals, convenience food, and home-cooked meals;
- the quality and convenience of healthy food options in the local food retail environment may influence consumer food choices;
- consumer choices about food purchases and activities may reflect preferences in direct ways (as when we eat the foods we like or do activities we enjoy) and also indirect ways (as when we spend time in difficult physical exercise or eat less-preferred foods because of their healthiness).

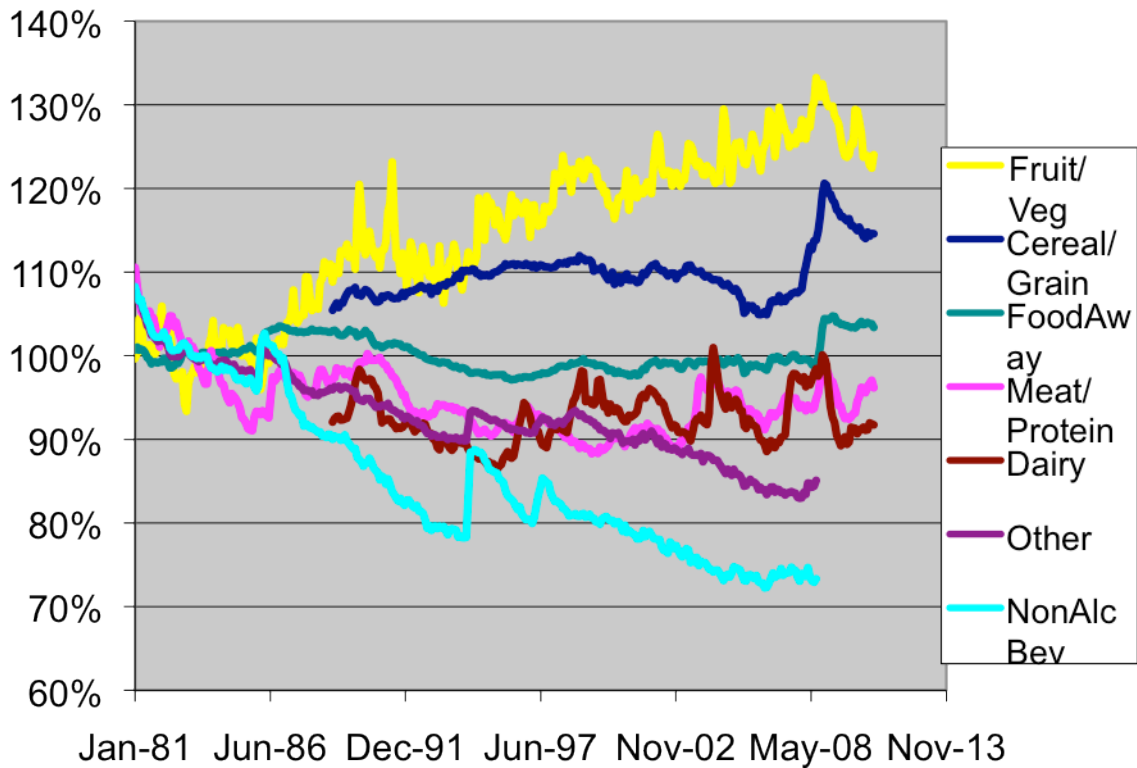
The traditional theory of choice points our attention toward trends in food prices and incomes. With regard to prices, one important pattern in the United States is that the price of food has fallen relative to the price of other goods and services. For example, Lakdawalla and Philipson (2002) show that the relative price of food overall compared to the overall CPI in the U.S. has declined from 1951-2000, with the exception of an increase related to the oil price shocks of the late 1970s. A second pattern is that prices evolve differently for some food groups than for others. Using 1981 as the base time period, Figure 1 shows in subsequent months how each food group's price increased relative to the average increase in the level of prices for all foods and beverages combined. Thus, by 2008, the price of fruits and vegetables had increased most rapidly (index \approx 130%), the price of food away from home had increased at the same rate as overall food and beverage average prices (index \approx 100%), and the price of soda and other non-alcoholic beverages had increased much more slowly than the overall average (index \approx 75%).³ These trends have raised the concern that comparatively more healthy choices have become relatively more expensive (Drewnowski, 2005).⁴

³ Wilde and Llobrera (2009) study use of programming models to assess the cost of a healthful diet.

For example, Drewnowski and Darmon (2010), document variation between energy density, nutrients, and costs in French data, finding energy dense foods like fats and oils, sugar, refined grains, and others were the cheapest.

With regard to incomes, the United States is sufficiently prosperous that food uses up less than 10% of income for most households. Yet, there remains a significant population of low-income Americans for whom the income constraint is more influential. The overall U.S. poverty rate (share of persons in families with incomes below the official poverty line) recently increased from a low point of 11.3% in 2000 to 15.1% in 2010, which nearly equals the peak levels of 15.2% during the recession of the early 1980s. Real median household income had risen some since 1981, but median income growth has not been robust (DeNavas-Walt, Proctor, and Smith, 2010).

Figure 1 Relative Prices of Various Foods, seasonally adjusted U.S. City Averages, 1981-2010



Beyond prices and incomes, more elaborate nutrition-oriented theories point our attention toward additional broad trends in recent years. Time spent preparing food has fallen as technologies have changed (e.g., Cutler, Glaeser, and Shapiro, 2003). At the same time, work has changed, perhaps reducing calories expended thereby. Women are increasingly in the workforce and spending less time in home production. Restaurant food and convenience food have become more important food sources.

3. A Framework for Nutrition Policy Options

3.1 Market Outcomes and Market Failures

Economic theory suggests a rationale for society to rely predominantly on private-sector markets to produce and distribute food. At their best, markets can overcome major challenges in motivating economic actors to make socially beneficial production and consumption decisions, while also providing them with the information they need to do so. The traditional economic theory suggests that governments should defer to market outcomes except in specific circumstances of “market failure.” We will discuss several market failures that have been suggested as motivations for government action. In addition, we will discuss other non-economic perspectives with influence in food and nutrition policy.

Economists focused on nutrition concerns, particularly obesity, have suggested three market failures that could motivate government action (Cawley, 2006):

- **Food choices of children.** Most economic theory assumes that consumers are rational adults who can make their own spending decisions. There is a strong justification for government institutions, such as public schools, to promote

nutrition for children. (Public health motivations for policies that also affect adults are mentioned below in Section 2.3).

- **Imperfect information.** Market outcomes are efficient only if consumers (and other actors) have the information they need to make purchases that satisfy their preferences. Consumer preferences include nutritional qualities and food safety as well as the more obvious taste qualities of food. Private-sector markets offer plenty of profit incentive for providing food that tastes good, but they may offer an insufficient incentive for providing information about nutrition qualities. Asymmetric imperfect information (discussed in Section 2.2) is a commonly cited justification for government activities that affect the food system.
- **Negative externalities.** Market outcomes may not be optimal if there are externalities, where one person's decisions affect other people's well-being through non-market interactions. One type of interaction comes from the operation of insurance and health programs. For a person who receives health care from the government, the financial costs of illness are paid largely by taxpayers. Even for people who have private insurance, through their employer or by paying their own insurance premiums, financial costs of illness are shared with other people in the same insurance risk pool. It seems possible that insurance markets could reduce the incentive to maintain a healthy weight. On the other hand, some economists suggest that labor markets may already partly compensate for variations in insurance costs, by paying some workers more than others, in which case the negative externalities through health insurance markets would be smaller (Bhattacharya and Sood, 2005; Bhattacharya and Bundorf, 2009).

There are several additional reasons why food and agricultural markets may not satisfy the traditional assumptions of perfect competition. In some industries, such as meat packing nationally (Ward, 2010) and grocery retail at the local level (Sexton, 2010), there may be few competing firms. In other industries, such as the seeds for genetically modified food crops, patent rights may give a small number of firms significant market power (Moschini, 2010). In yet other industries, such as food manufacturing and quick service restaurants, the predominant industry structure may be monopolistic competition, where each firm supplies differentiated branded food products and yet must compete to a certain extent with other firms that provide similar products (Merel and Sexton, 2011). We will return to the topic of differentiated products in discussing food advertising in Section 5.2.

3.2 Imperfect Information

A situation of imperfect information is described as “asymmetric” if the producer knows more about a food product’s attributes than the consumer does. Relevant attributes may include taste, wholesomeness, safety, and nutrition qualities. Under asymmetric information, food product attributes may be classified based on how the consumer learns about the product:

- For **search attributes**, the consumer can determine a product’s quality by visual inspection in the store.
- For **experience attributes**, the consumer can determine a product’s quality after purchasing it, learning lessons that can be used in future purchases.
- For **credence attributes**, the consumer cannot confirm a product’s quality and must trust the information provided by the seller or by a third party.

A single good may have some attributes that fall into one category and other attributes that fall into a different category. For example, a bag of carrots may be seen as a search good for a shopper trying to follow the *Dietary Guidelines* recommendation to consume orange vegetables; the same bag may be seen as a credence good for a shopper seeking organic produce. Common government responses to asymmetric information range from process regulations (such as specifying what additives are safe to use in food) to food grading systems to labeling rules (discussed in Section 3.3).

In addition to having imperfect information, consumers may not satisfy the traditional economic theory's assumptions about rationality. A lively and rapidly growing body of research addresses behavioral economics, including strategies for “nudging” economic actors in the direction of more optimal food choices, without taking away their freedom to make their own decisions (see Section 8).

3.3. Policy Response

Economists commonly favor government policies that narrowly target a market failure that has been identified. In situations where there is no market failure, such as when well-informed adults freely choose and accept the consequences of unhealthy eating patterns, many economists say there is no need for a government policy response.

In addition to the economic perspective on diagnosing market failures, there are three other motivations that strongly influence actual government policies regarding nutrition and thus are given attention here to help researchers understand ongoing policy debates.

- A **public health** perspective gives less deference to market outcomes and favors use of a broad range of policies thought by adherents to affect food choices and dietary quality.
- A wide variety of **producer** perspectives favor government nutrition policies that promote the interests of particular sectors of the agricultural, food manufacturing, and food retail industries.
- An **egalitarian** perspective focuses on income inequality as a motivation for government intervention in food and agricultural markets. For example, a motivation for federal food assistance programs is not just nutrition promotion but also poverty alleviation.

Responding to both economic and non-economic motivations, leading policies and policy proposals fall into four broad categories, discussed in the next four sections: food assistance programs (Section 4), information policies (Section 5), direct price interventions such as taxes and subsidies (Section 6) or government restrictions or subsidies to supply (Section 7). We conclude with a discussion of behavioral economics and nudges (Section 8).

4. Food Assistance Programs

One way for governments to address nutrition concerns is directly, through food assistance and nutrition programs. This section provides some background about food assistance programs (Section 4.1), explains how such programs affect household budgets (Section 4.2), and describes research that seeks to measure program effects (Section 4.3).

4.1. Background on Food Assistance Programs

Food assistance programs may provide food through several mechanisms, including the following: (1) broadly targeted food benefits that low-income consumers may use to purchase food through normal retail channels, (2) more narrowly targeted food vouchers for purchase of specific foods and beverages with particular nutritional qualities, and (3) direct provision of free meals. In addition to food assistance programs, more general income support programs may have benefits for nutrition or food security. This section principally uses U.S. food assistance programs as examples of each type of program, because food assistance plays a bigger role in the social safety net in the United States than in other developed countries (Wilde, 2011).

1. Broadly targeted food benefits. In the United States, the largest food assistance program is the Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps. SNAP provides targeted benefits for food and nonalcoholic beverages from authorized grocery retailers through Electronic Benefit Transfer (EBT) cards similar to debit cards. It served 40.3 million people per month on average during fiscal year 2010 at a total cost of \$68.2 billion. Program eligibility historically has depended largely on having income below 130% of the federal poverty standard, so the program is counter-cyclical, and caseloads have recently risen to record levels during the recent recession. The primary purpose of the program is to prevent hunger and promote food security.

2. Narrowly targeted food vouchers. The Special Supplemental Food Program for Women, Infants and Children (WIC) provided nutrition counseling, services, and a package of particular high-nutrient foods and infant formula to about 9.2 million people

per month, at a cost of \$6.8 billion in fiscal year 2010. Only pregnant and post-partum women, infants, and children through age 4 are eligible. Eligibility also requires household income under 185% of the federal poverty standard or participation in one of several other safety net programs, plus evidence of nutrition risk broadly defined.

3. Direct provision of meals. The National School Lunch Program served 31.6 million lunches, and the smaller and newer School Breakfast served 11.6 million breakfasts, on average, each school day in fiscal year 2010, at a cost of \$13.3 billion. A free meal requires income below 130% of the federal poverty standard, though all federal school meals are subsidized to some extent. The Child and Adult Care Food Program served meals in centers and home day care settings, costing \$2.6 billion (Oliveira 2011). These programs have primary nutrition goals, but anti-hunger effects are acknowledged as important secondary purposes.

4. Cash assistance and cash-based social insurance. Finally, governments provide cash welfare which can be used for food as well as other products. In 2009, 1.8 million families with children obtained Temporary Assistance for Needy Families cash benefits, with total cash benefit payments amounting to \$9.3 Billion. Supplemental Security Income, or cash welfare for poor disabled, blind, or elderly individuals amounted to \$41 billion for 6.4 million recipients. Unemployment insurance is another important part of the safety net, with payments of about \$131 Billion in 2009.⁵

⁵ Figures from Bitler and Hoynes 2010, and sources therein.

4.2. How Food Assistance Affects Household Budgets

The effect of food assistance on food choices depends on the role of program benefits in the household budget. To understand this role in a rigorous way, it helps to compare the effects of: (a) providing a targeted food assistance benefit or (b) providing a hypothetical equivalent cash subsidy. For example, consider a monthly voucher that provides a family with \$50 for use in purchasing qualifying food products. The hypothetical comparison program provides \$50 in cash.

- If a family with the hypothetical cash benefit would have spent less than \$50 per month on qualifying foods, the family is called **extramarginal** or constrained by the form of the benefits, because the voucher program causes more food spending than would otherwise have occurred.
- By contrast, if a family with the hypothetical cash benefit would have spent greater than \$50, the family is called **inframarginal** or unconstrained by the form of the benefits, because it is able to purchase its desired amount of qualifying foods under either the targeted voucher or the hypothetical cash program.

Economic theory predicts that a marginal increase in targeted food assistance benefit will strongly affect food spending for extramarginal participants, and the increase will only weakly affect food spending for inframarginal participants. Empirical research commonly finds bigger program effects than expected for inframarginal participants in targeted food assistance benefits programs (Wilde, Troy, and Rogers, 2009; Meyerhoefer and Yang, 2011).

4.3. *Measuring the Effects of Food Assistance Programs*

A challenge discussed elsewhere in this volume is obtaining causal estimates of the effects of food assistance programs. One cannot merely compare the outcomes of recipients and others due to selection bias in who takes up these programs. Given that participation is tied to low income and asset holdings or poor nutritional status or both, it is clear that comparisons of outcomes for program recipients to those of the general population are likely to be biased. Even among those eligible for the programs, recipients may be positively or negatively selected compared to eligible non-participants due to the fact that participation is a choice variable. If recipients are healthier, more motivated, or more knowledgeable about the programs than non-participants, comparisons may suggest the program has a more positive effect than it actually does. Alternatively, if participants are more disadvantaged than eligible non-participants, comparisons of these two groups could lead to underestimates of the effects of the program. For example, skeptics often attribute many of the positive effects of the WIC program to positive selection among women participating in the program, although Bitler and Currie (2005) find little evidence that WIC participants who also participate in Medicaid are positively selected.

There are several approaches that researchers have taken to avoid selection bias (Gundersen, Kreider, and Pepper, 2011; Meyerhoefer and Yang, 2011). One approach is to compare outcomes among individuals in geographic areas with different program rules, using panel data on individuals or pooled cross sections of individuals, typically with controls for geographic entity and time. This approach relies on individuals with similar incomes and other characteristics being comparable across geographic entities with different income thresholds for eligibility for programs or different rules about how

individuals stay eligible for programs. This approach is problematic for many food assistance programs, due to the fact that these programs are national with common rules across entities. For example, until recently, SNAP or food stamps allowed little leeway for states in setting program rules. Examples of this approach for SNAP using more recently introduced state rule variation include Kabbani and Wilde (2003), Ratcliffe, McKernan, and Zhang (2011), and Yen et al., (2008).

When there is no geographic variation, another approach is to limit the analysis to more comparable treatment and control groups. For example, with respect to WIC, Joyce, Racine, and Yunzal-Butler (2008) point out that some part of the estimated positive effects of the program on preterm births may be spurious due to the fact that late WIC enrollees by their very nature do not have preterm births. Figlio, Hamersma, and Roth (2009) find some positive effects of WIC on low birth weight, using more narrow treatment and control groups than the previous literature. Bhattacharya, Currie, and Haider (2006) look at the effects of school breakfast by comparing children across schools with and without the School Breakfast Program, comparing outcomes during the summer to other periods. They find that availability of the School Breakfast Program improves the quality of food consumed and decreases the probability of having too low levels of important micronutrients.

Another approach when program rules do not vary across areas is to look at the effects of the introduction of programs, comparing otherwise similar individuals in places before and after programs are introduced. Several examples of this approach are described next. Hoynes and Schanzenbach (2009), find that introduction of the food stamp program led to increases in food consumption; and Almond, Hoynes, and

Schanzenbach (2011), find that the introduction of food stamps led to increases in birthweight. Hoynes, Page, and Stevens (2011) show that the introduction of the WIC program led to an increase in average birth weight and a decrease in low birth weight. Hinrichs (2010) finds that the National School Lunch program had statistically significant effects on educational attainment but little long-run health impact. Moffitt (1989) finds that converting the in-kind food stamp vouchers to cash benefits in Puerto Rico lead to no change in food expenditures. An important challenge with using evidence about program introduction to inform current debate is that program rules may change in important ways over time, potentially raising questions about the ongoing validity of historical estimates for evaluating programs today.

Another approach to studying the effects of programs is to use random assignment. If program administrators are able to randomly assign an offer of program participation to otherwise identical eligible individuals, then comparisons of those assigned to be eligible for the program with those denied the option to participate can yield unbiased estimates of the effects of the program. In the case of food stamps, there have been several demonstration projects funded by USDA, which have yielded evidence about the effects of cashing out food stamp benefits on food spending (Fraker, Martini, and Olhs, 1995).

Another approach to studying the effects of such programs is to use variation in program rules that use exogenous thresholds to assign program eligibility. These regression discontinuity approaches compare otherwise similar individuals who because of small differences in a characteristic such as age face different program rules, while controlling for age. Schanzenbach (2009), using such a design compares children whose

income makes them just eligible or ineligible for reduced price school lunch, finding that being eligible led to an increase in weight. Anderson, Butcher, Cascio, and Schanzenbach (forthcoming) use differences in years of school attended due to regulations on school starting ages, and find that for children of the same age, another year of schooling has no significant effect overall on children's weights.

Much progress has been made on the effects of food assistance programs, yet there are outstanding questions. For example, how does a program like WIC obtain positive results with relatively low benefit levels? What channels do effects of these programs work through? What is the role of information in the effects of these programs?

5. The Economics of Information Policy

A second type of public policy intervention to address nutrition concerns is to seek to influence the information environment in which consumers make food-related decisions. For example, governments may seek to promote nutrition through dietary guidance, regulation of food labeling, and regulation of advertising.⁶ Private mechanisms that affect quality include brand names and reputation as well as standard setting.

Information policies may be classified on a spectrum, running from mandatory information, to voluntary information provision chosen freely by the producer, to voluntary information with restrictions imposed by the government, to outright

⁶ Ippolito (2003) also discusses the role of government in supporting research into what characteristics of goods matter and how to measure them, research which may have a public good element. The relevant example here is the role of various nutrients.

prohibitions against a particular type of information provision. This spectrum is shown in Figure 2.

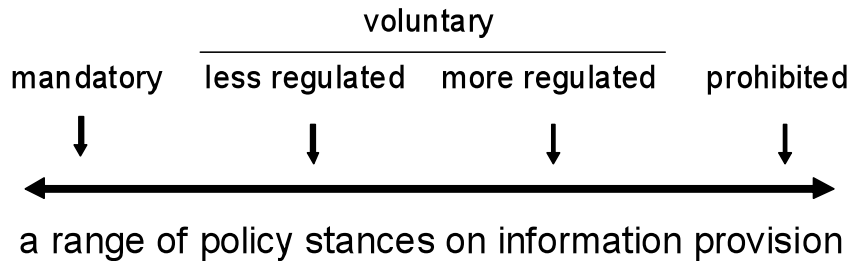


Figure 2. A spectrum of policy stances on information provision.

At each point along this spectrum, the policy debate depends in part on what one believes are the real facts about the relationship between food decisions and health. Some information sources recommend diets that are low in carbohydrates; some recommend diets that are low in fat and high in plant foods; some say humans as omnivores can thrive on either of these diets so long as we avoid highly-processed manufactured foods. In the United States, the federal government’s *Dietary Guidelines for Americans*, issued once every five years, recommend a diet with plenty of fruits, vegetables, whole grains, and low-fat dairy products, within the context of an overall diet that maintains a healthy weight by balancing total energy intake with energy expenditure needs (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010). In promulgating dietary guidelines, the government seeks to remedy some of the confusion in private-sector information markets by identifying dietary principles that are supported by the balance of the scientific evidence.

There is comparatively little need for government regulation of food labeling and advertising for food attributes such as taste, which can be confirmed by search and experience, because correct information about such attributes is readily available to the consumer (Caswell and Mojduzka, 1996). The government has a more substantial role in regulating claims about nutrition and health qualities, which are credence attributes (see Section 3.2).

Yet, even for credence attributes, markets sometimes function well on their own. Even before nutrition facts panels became mandatory in the early 1990s, many food products carried nutrition information voluntarily (Golan et al., 2001). One might at first suspect that only the healthiest products would provide nutrition information, but competitive pressure may force a wider range of products to disclose information (Ippolito, 1999). Once consumers catch on that non-disclosure indicates that a product lacks a healthful characteristic that competitors have, there is an incentive for all but the least healthy products to disclose information voluntarily. This theory of competitive information disclosure works better in some situations than in others. For example, if all products in a food category share a certain characteristic, such as the dietary cholesterol in eggs, there is no incentive for companies to advertise the shortcomings of their competitors. A USDA report on the economics of food labeling observed that market incentives also may fail to eliminate partial disclosure and innuendo (Golan et al., 2001).

5.1 Regulation of Food Labeling

U.S. food labeling policies include rules that mandate some kinds of information provision and rules that prohibit other kinds. In the first half of the Twentieth Century, the federal government established standards of identity for many food products and

began requiring disclosure of net weights and ingredients for manufactured food and beverages. Nutrition facts panels were introduced on a voluntary basis in the 1970s and became more widespread during the 1980s. Since the passage of the 1990 Food Labeling and Education Act (NLEA), nutrition facts panels have been mandatory on most packaged food in the United States. More recent legislation has required mandatory country-of-origin labeling (COOL) on a wider variety of food products. The 2008 Farm Bill for the first time required disclosure of calorie information in chain restaurants.

Meanwhile, until the 1980s, the Food and Drug Administration (FDA) generally refused to permit health claims on food labels, fearing that consumers would be misled. The 1990 NLEA allowed health claims on food labels if there is “significant scientific agreement” about the merit of the claims.⁷ For example, many low-sodium products may use a health claim that reducing sodium can lower high blood pressure. Subsequent legislation and court cases have forced the Food and Drug Administration (FDA) to allow

⁷ Variyam and Cawley (2006) looks at the effects of the NLEA on body weight and obesity, finding it led to a decrease in weight among women who used labels. Bollinger, Leslie and Sorensen (2011) look at the effects of a policy in New York City requiring chains to post calories for food on purchases at Starbucks, finding that average calories per transaction fell, and this was through changes in purchases of food, not beverages. Jin and Leslie (2009) study the question of reputational incentives through the example of restaurant hygiene. They find that reputational incentives indeed provide a market based mechanism for quality, but that despite this government issued report cards caused an increase in hygiene, using data from Los Angeles County.

a broader range of claims. The 1994 Dietary Supplement and Health Education Act (DSHEA) led to a weaker standard of evidence for what are called structure-function claims, which do not mention a specific disease as health claims do. For example, “calcium builds strong bones” is a structure-function claim. More recently, in response to a successful lawsuit about health claims on dietary supplements, the FDA has begun to allow health claims for which the evidence is not strong enough to qualify as significant scientific agreement, so long as the food package label includes a disclaimer describing the level of scientific evidence for the claim.

Remedies for the problem of misleading claims may come from the private sector, the government, or both in combination. The for-profit media frequently cover food issues, describing recent research in nutrition science and food safety. Private not-for-profit organizations also can serve as independent watchdogs. As an alternative business model, not-for-profit organizations and for-profit businesses may offer third-party certification of nutrition labeling claims made by food companies. For example, in return for a fee paid by food companies, the American Heart Association allows food manufacturers to label qualifying products with an AHA heart-check symbol certifying that they are low in saturated fat and cholesterol or high in whole grains. In still other cases, the government helps set standards for a food label claim, which then may be used voluntarily by private-sector businesses that meet the standard. For example, the “certified organic” label may only be used on foods that meet a checklist of process standards, which exclude the use of certain chemicals and practices in agricultural production and food processing. Qualifying food producers choose voluntarily to produce food organically.

5.2 *The Economics of Food Advertising*

Under perfect competition, producers of a standardized commodity have no incentive to advertise, because each firm's investment in advertising would reap gains in consumer demand that are shared with all of the firm's competitors. Each perfect competitor would have an incentive to be a "free rider," allowing competitors to bear the cost of advertising. Clearly, this model of industry structure does not provide a compelling description of the food and beverage manufacturing industries or the chain restaurant industry, where heavy advertising is widespread.

Instead, a model of industry structure that better describes these industries is monopolistic competition. In this model, each firm is the monopoly producer of its own branded product, and it competes to a certain degree with competitors who are similar. Competitors may be similar because they are physically nearby, as in the case of local food retailers who compete most strongly with other firms that are geographically close. Competitors also may be similar in a psychological sense, as in the case of quick-service restaurants that serve a similar clientele and occupy a similar marketing space. Under monopolistic competition, firms have a strong incentive to advertise.

6. Direct Interventions: Taxes and Subsidies

Some public health advocates, researchers, and policy-makers recommend that the government go even further, guiding consumers toward healthier diets by altering prices, taxing less healthy foods and beverages and subsidizing their more healthy counterparts. In 2010, the Director of the Centers for Disease Control and Prevention, Thomas Frieden,

and two CDC colleagues wrote: “A tax of 1 cent an ounce on sugar-sweetened beverages—about a 10 percent price increase on a twelve-ounce can—would be likely to be the single most effective measure to reverse the obesity epidemic” (Frieden et al., 2010).

The success of such a proposal depends on the size of the consumer response to a change in the price of food. Recall from Section 2 that an own-price elasticity shows the percentage change in a product’s quantity consumed, in response to a 1% increase in the product’s price. Economists who study taxation policy recommend that taxes be placed on goods whose demand is inelastic (not responsive to a change in price), because such taxes raise more revenue and do not distort the market equilibrium as much as taxes on goods with elastic demand, causing smaller dead weight losses from the policy (Deaton, 1997). By contrast, health policy advocates tend to prefer that taxes be placed on unhealthy foods whose demand is elastic (responsive to a change in prices), because these taxes have the biggest impact on food choices. Some clever proposals seek the best of both worlds, by taxing an unhealthy food and earmarking the resulting revenue for health promotion programs (Nestle and Jacobson, 2000).⁸

There is a large research literature that seeks to estimate consumer demand elasticities (a few recent relevant studies include Andreyeva et al., 2010; Okrent and

⁸ Note that such use of revenue to affect demand for healthy foods would invalidate the use of such tax changes as instruments for studying the effect of unhealthy food consumption on health, as it would mean that the taxes might directly affect health rather than only indirectly affect health through changing consumption of the unhealthy foods.

Alston, 2011; Smith et al., 2010). A sampling of results from many such studies is presented in Table 2. To interpret such estimates correctly, the reader must keep in mind that food groups are defined differently in different studies. For example, an own-price elasticity for a narrowly defined food group with many substitutes (such as potato chips) will be larger in absolute value than the own-price elasticity for a more broadly defined food group with fewer substitutes (such as all types of chips combined) (Kuchler et al., 2004).

Table 2. Selected own-price, cross-price, and expenditure elasticities for food demand.

Description	Elasticity
Mean value of the own-price elasticity for selected foods (literature review by Andreyeva et al., 2010):	
Food away from home	-0.81
Soft drinks	-0.79
Juice	-0.76
Beef	-0.75
Pork	-0.72
Fruit	-0.70
Poultry	-0.68
Dairy	-0.65
Sweets/sugars	-0.34
Eggs	-0.27
Own-price elasticities for salty snacks (Kuchler et al., 2004):	
Potato chips	-0.45
All chips	-0.22
U.S. beverage demand elasticities, 1998-2007 (Smith et al., 2010):	
Caloric sweetened beverages (own-price elasticity)	-1.264
Caloric sweetened beverages (elasticity of response to price of juice)	0.233
Caloric sweetened beverages (expenditure elasticity)	1.054
Juice (own-price elasticity)	-1.012
Juice (elasticity of response to price of caloric sweetened beverages)	0.557
Juice (expenditure elasticity)	0.878

Also, to correctly anticipate the nutrition consequences of a proposed tax, the reader must consider cross-price effects. For example, Smith et al. (2010) combine data on consumer grocery purchases of beverages from the Nielsen Homescan panel with data from the National Health and Nutrition Examination Survey on individual consumption of beverages and height and weight. They first use the variation across places in beverage purchases to estimate a demand system for the effects of price changes for caloric sweetened beverages on consumption of drinks. The corresponding price elasticities are used to predict the effect of a proposed tax on caloric sweetened beverages, not only on consumption of the targeted beverages but also on potential substitutes, including juice. Using their estimates, Table 2 shows that each 1% increase in the price of caloric sweetened beverages might reduce intake of these targeted beverages by 1.264%, while simultaneously increasing the intake of juice by 0.557%. After considering both direct effects and such substitutions toward other beverages, the authors estimated that a tax-induced 20-percent price increase on caloric sweetened beverages would change overall food energy intake by enough to reduce adult overweight prevalence from 66.9 to 62.4% (Smith et al., 2010). The Smith et al. study addresses issues missed in some other demand studies; including careful attention to cross-good price elasticities and differentiating caloric sweetened beverages from diet beverages; and is also clear about what cannot be estimate (the effect of food purchased away from home is naturally absent from data on grocery store purchases).

However, there is still a challenge in applying these or other estimates to predict effects of a large tax change on sugar sweetened beverages. Many such demand studies make use of time series variation in prices and aggregate data on expenditures, which

may or may not be applicable to changes in taxes and individual level consumption. It is also challenging to find appropriate data to estimate effects fully on complements and substitutes for specific goods, and often the analyst only has data on purchases at grocery stores, or alternatively, consumption data with no corresponding price and location of purchase. An alternative approach uses individual level data and tax changes. An example of this work would be Fletcher et al., (2010), which looks at the effects of existing taxes on soft drinks on child and adolescents, using NHANES data. Fletcher et al., (2010) finds that for children and adolescents, tax-induced reductions in soft drink consumption are offset with increases in consumption of milk and other beverages, raising doubt about the value of such taxes in reducing obesity. (Other work by the same authors looks at other groups). Unfortunately, one limitation to this to such an approach is that samples in data sets like NHANES with intake data are relatively small and the combined state-year panel limited.

Nutrition taxes face several sources of opposition. First, they generally are regressive, with a higher relative budget impact for low-income populations than for higher-income populations. Second, as noted throughout the chapter, there may be disputes over the nutrition science basis, although one exception with somewhat broader but far from uniform scientific support is a tax on caloric sweetened beverages. Quantifying the causal effects of prices and taxes on food consumption and health is an ongoing area of research where new approaches and data would be useful. New causal evidence awaits more policy interventions, better data on purchase prices and quantities at and away from home, or both.

7. Government supply interventions

The final set of policies we touch on are related to increasing or restricting access to food. One subject which has received much attention is whether some areas have sufficient access to appropriate food. In a relatively large public health literature, evidence is presented about the correlations between areas with a high concentration of low income residents and a dearth of large retail food stores selling healthy foods such as food and vegetables. Congress mandated in the 2008 Farm Bill that USDA study this so-called problem of food deserts (areas with limited access to affordable and nutrition food) and suggest policy responses, resulting in a report (Ver Ploeg et al., 2009), a food desert locator, as well as some other action. Bitler and Haider (2011) reviews the existing evidence about this topic, concluding that while there is ample evidence of some local areas where food access is limited, little or no research has established the causes of such limited access, and such information is a key input to designing appropriate policies. For example, limited access could be the result of supply or demand factors, and if it is the result of demand factors, supply interventions are not likely to ameliorate deficiencies. Yet further policy intervention seems likely, and may provide useful variation for new research.

Another policy lever that is widely discussed is zoning or other regulations limiting the types of food establishments or types of foods available in various locations. An example of this is the recent ban on opening new fast food outlets in South Los

Angeles.⁹ Another example is efforts to limit sales of competitive foods in schools (competitive foods are all foods offered for sale at schools besides those provided by USDA school meals programs). Should more localities enact policies banning such sales, it may provide variation to understand how access to such foods affects school health.¹⁰ This would support the findings by Anderson and Butcher (2006) suggesting that schools facing financial pressures are more likely to allow competitive food sales and have students with larger BMI.

8. Behavioral Economics: Nudges

The economic understanding of consumer responses to prices and income (Section 2) and the policy proposals for new subsidies or taxes (Section 6) and supply interventions (Section 7) all rely on an economic theory of consumer choice. A lively body of current economic research investigates situations where consumers do not behave according to the rationality assumptions of this theory, perhaps leading to

⁹ Interestingly, Sturm and Cohen (2009) document that contrary to common perception, restaurant density in South LA was lower than in LA County overall.

¹⁰ Datar and Nicosia (2009) compare competitive food use for fifth graders in middle schools relative to those in elementary schools, using the fact that competitive foods are more common in middle and high schools. They find no evidence such access leads to more consumption of junk food, suggesting substitution across in school and out of school locations. This identification scheme relies on the assumption that attending a middle versus elementary school only affects food choice and BMI via changing access to competitive foods.

opportunities for “nudging” consumers toward more healthful choices (Thaler and Sunstein, 2008).

For example, neoclassical theory predicts that consumers will eat less when the marginal cost of an additional unit – the price to the consumer – is higher. They will tend to overeat at an all-you-can-eat restaurant, because the marginal cost of additional food is zero, no matter what the entry price of the meal. Yet, surprisingly, recent research found that consumers of an all-you-can-eat pizza meal actually consumed more pizza if the price of the meal was higher. The authors hypothesized that consumers may be following a heuristic, or simple decision rule, that they should eat enough to get their money’s worth (Just and Wansink, 2011).

Various heuristics of this type have been proposed as explanations for consumer decisions about food (Just, Mancino, and Wansink, 2007):

- Consumers may be strongly influenced by default offerings, even when given the opportunity to select a different option. For example, it may make a difference whether a children’s meal from a quick service restaurant chain includes milk or soda as the default option for customers who do not volunteer a preference.
- Consumers may be affected by distractions, because of the cognitive burden of making healthful choices. One study found that subjects were more likely to choose cake over fruit salad if they were required to make other decisions at the same time (Shiv and Fedorikhin, 1999, cited in Just, Mancino, and Wansink, 2007). Similarly, people may make different decisions when hungry or under time stress.

This new approach to behavioral economics has raised some hopes for inexpensive nutrition improvements, by making subtle changes to the setting or

environment in which choices are made. For example, some suggest that students in school meals programs might make better decisions if the location of the salad bar were altered, or if a different tender (cash or school meals program card) were required for different products (Just and Wansink, 2009). This approach also has generated renewed scrutiny of the empirical evidence for other health policy proposals, such as taxes on less healthy food or new labeling rules for restaurants (Loewenstein, 2011; Downs, Loewenstein, and Wisdom, 2009). Of course, many of the same lessons can also be used by food marketing professionals to promote food options with any health profile. Whether the potential for “nudges” turns out to be a comparatively small niche opportunity or a major tool in social policy, the willingness to scrutinize assumptions and follow the empirical evidence in new directions is entirely good news for future research on the economics of nutrition.

Sources

- Almond, D., H.W. Hoynes, and D.W. Schanzenbach. 2011. Inside the War on Poverty: the impact of food stamps on birth outcomes. *Review of Economics and Statistics* 93:2, 387-403.
- Anderson, P., and K. Butcher. 2006. Reading, writing, and refreshments: Are school finances contributing to children's obesity? *Journal of Human Resources* 61:3, 467-494.
- Andreyeva, T., M.W. Long, and K.D. Brownell. 2010. The impact of food prices on consumption: A systematic review of research on the price elasticity of demand for food. *American Journal of Public Health* 100:2, 216-222.
- Bhattacharya, J., and M.K. Bundorf. 2009. The incidence of the healthcare costs of obesity. *Journal of Health Economics* 28, 649-658.
- Bhattacharya, J., and N. Sood. 2005. *Health insurance and the obesity externality*. National Bureau of Economic Research Working Paper 11529.
- Bitler, M.P., and J. Currie. 2005. Does WIC work? The effects of WIC on pregnancy and birth outcomes. *Journal of Policy Analysis and Management* 24:1, 73-91.
- Bitler, M.P., and S.J. Haider. An economic view of food deserts in the United States. *Policy Retrospectives, Journal of Policy Analysis and Management* 30:1, 153-176.
- Bitler, M.P., and H.W. Hoynes. 2010. The state of the safety net in the post-welfare reform era. *Brookings Papers on Economic Activity* 2, 71-127.
- Bollinger, B., P. Leslie, and A. Sorensen. 2011. Calorie posting in chain restaurants. *American Economic Journal: Economic Policy* 3:1, 91-128.
- Caswell, J.A., and E.M. Mojduszka. 1996. Using informational labeling to influence the market for quality in food products. *American Journal of Agricultural Economics* 78:5, 1248-1253.
- Cawley, J. 2006. Markets and Childhood Obesity. *The Future of Children* 16:1, 69-88.
- Cawley, J., and C. Meyerhoefer. 2010. The medical care costs of obesity: An instrumental variables approach. National Bureau of Economic Research Working Paper 16467.
- Bhattacharya, J., J. Currie, and S. Haider. 2006. Breakfast of champions? The effects of the School Breakfast Program on the nutrition of children and their families. *Journal of Human Resources* 41:3, 445-466.
- Cutler, D.M., E.L. Glaeser, and J. Shapiro. 2003. Why have Americans become more obese? *Journal of Economic Perspectives* 17, 93-118.
- Datar, A., and N. Nicosia. 2009. Junk food availability and childhood obesity: Much ado about nothing? RAND Working Paper 672.
- DeNavas-W., B. Proctor, and J. Smith. 2010. U.S. Census Bureau, Current Population Reports. Income, Poverty, and Health Insurance Coverage in the United States: 2009.
- Deaton, A. 1997. *The analysis of household surveys: A microeconomic approach to development policy*. World Bank Publications.
- Drewnowski, A. 2010. The cost of US foods as related to their nutritive value. *American Journal of Clinical Nutrition*. 92:5, 1181-1188.
- Drewnowski, A., and N. Darmon. 2005. Food choices and diet costs: An economic analysis. *Journal of Nutrition* 135:4, 900-904.
- Figlio, D., S. Hamersma, and J. Roth. 2009. Does prenatal WIC participation improve birth outcomes? New evidence from Florida. *Journal of Public Economics* 93:1-2, 235-245.

- Finkelstein, E.A., J.G. Trogdon, J.W. Cohen, and W. Dietz. 2009. Annual medical spending attributable to obesity: Payer-and service-specific estimates. *Health Affairs* 28, w822.
- Fletcher, J., D. Frisvold, and N. Tefft. 2010. The effects of soft drink taxation on soft drink consumption and weight for children and adolescents. *Journal of Public Economics* 94:11-12, 967-974.
- Fogel, R. W. 2004. *The escape from hunger and premature death, 1700-2100: Europe, America, and the Third World*. Cambridge Studies in Population, Economy, and Society in Past time Volume 38. Cambridge University Press.
- Fraker, T.M., A.P. Martini, and J.C. Ohls. 1995. The effect of food stamp cashout on food expenditures: An assessment of the findings from four demonstrations. *Journal of Human Resources* 30:4, 633-649.
- Frieden, T.R, W. Dietz, and J. Collins. 2010. Reducing childhood obesity through policy change: Acting now to prevent obesity. *Health Affairs* 29:3, 357.
- Golan, E., F. Kuchler, L. Mitchell, C. Greene, and A. Jessup. 2001. Economics of food labeling. *Journal of Consumer Policy* 24:2, 117–184.
- Gundersen, C., B. Kreider, and J. Pepper. 2011. The economics of food insecurity in the United States. *Applied Economic Perspectives and Policy* 33:3.
- Hinrichs, P. 2010. The effects of the National School Lunch Program on education and health. *Journal of Policy Analysis and Management* 39:3, 479-505.
- Hoynes, H.W., M. Page, and A. Stevens. 2011. Can targeted transfers improve birth outcomes? Evidence from the introduction of the WIC program. *Journal of Public Economics* 95:7-8, 813-827.
- Hoynes, H.W. and D.W. Schanzenbach. 2009. Consumption responses to in-kind transfers: Evidence from the introduction of the food stamp program. *American Economic Journal: Applied Economics* 1, 109–139.
- Ippolito, P. M. 1999. How government policies shape the food and nutrition information environment. *Food Policy* 24:2, 295–306.
- Ippolito, P.M. 2003. Asymmetric information in product markets: Looking to other sectors for institutional approaches. *American Journal of Agricultural Economics* 85:3, 731-736.
- Jin, G., and P. Leslie. 2009. Reputational incentives for restaurant hygiene. *American Economic Journal: Microeconomics*. 1:1, 236-267.
- Joyce, R., A. Racine, and C. Yunzal-Butler. 2008. Reassessing the WIC effect: Evidence from the Pregnancy Nutrition Surveillance System. *Journal of Policy Analysis and Management* 27:2, 277-303.
- Just, D.R., L. Mancino, and B. Wansink. 2007. Could behavioral economics help improve diet quality for nutrition assistance program participants? ERR-43. U.S. Department of Agriculture, Economic Research Service.
- Just, D.R., and B. Wansink. 2009. Smarter lunchrooms: Using behavioral economics to improve meal selection. *Choices* 24:3.
- Just, D.R., and B. Wansink. 2011. The flat-rate pricing paradox: Conflicting effects of “all-you-can-eat” buffet pricing. *Review of Economics and Statistics* 93, 193-200.
- Kabbani, N.S., and P.E. Wilde. 2003. Short recertification periods in the US Food Stamp Program. *Journal of Human Resources* 38(S), 1112–1138.
- Kuchler, F., A. Tegene, and J. M Harris. 2004. Taxing snack foods what to expect for diet and tax revenues. USDA Agricultural Information Bulletin 747.

- Lakdawalla, D., and T. Philipson. 2002. *The Growth of Obesity and Technological Change: A Theoretical and Empirical Examination*. National Bureau of Economic Research Working Paper 8946.
- Lakdawalla, D., T. Philipson, and J. Bhattacharya. 2005. Welfare-enhancing technological change and the growth of obesity. *American Economic Review Papers and Proceedings* 95, 253–257.
- Loewenstein, G. 2011. Confronting reality: Pitfalls of calorie posting. *American Journal of Clinical Nutrition* 93, 679.
- Merel, P., and R. Sexton. 2011. Models of horizontal product differentiation in food markets, In *The Oxford Handbook of the Economics of Food Consumption and Policy* (Jason Lusk and Jutta Roosen, eds.). Oxford University Press.
- Meyerhoefer, C.D. and M. Yang. 2011. The relationship between food assistance and health: A review of the literature and empirical strategies for identifying program effects. *Applied Economic Perspectives and Policy*.
- Moffitt, R. 1989. Estimating the value of an in-kind transfer: The case of food stamps. *Econometrica* 57:2, 385-409.
- Moschini, G. 2010. Competition issues in the seed industry and the role of intellectual property. *Choices* 25(2).
- National Center for Health Statistics (2011). Health, United States, 2010: With Special Feature on Death and Dying. Hyattsville, MD.
- Nestle, M., and M.F Jacobson. 2000. *Halting the obesity epidemic: A public health policy approach*. *Public Health Reports* 115:1, 12-24.
- Nord, M., A. Coleman-Jensen, M. Andrews, and S. Carlson. 2010. *Household Food Security in the United States (2009)*. USDA Economic Research Service Report ERR-108.
- Okrent, A., and J. M Alston. 2011. The demand for food in the United States: A review of the literature, evaluation of previous estimates, and presentation of new estimates of demand. *Giannini Foundation of Agricultural Economics Monograph* 48.
- Oliviera, V. 2011. The Food Assistance Landscape, FY 2010 Annual Report. USDA Economic Information Bulletin No. 6-8.
- Ratcliffe, C., S.M. McKernan, and S. Zhang. 2011. How much does the Supplemental Nutrition Assistance Program reduce food insecurity? *American Journal of Agricultural Economics* 93, 1082–1098.
- Schanzhabach, D.W. 2009. Do school lunches contribute to childhood obesity? *Journal of Human Resources* 44:3, 684-709.
- Sexton, R. 2010. Grocery retailers’ dominant role in evolving world food markets. *Choices* 25.
- Smith, T., B.-H Lin, and J.-Y. Lee. 2010. Taxing caloric sweetened beverages: Potential effects on beverage consumption, calorie intake, and obesity. USDA Economic Research Service, ERR-100.
- Sturm, R., and D.A. Cohen. 2009. Zoning for health? The year-old ban on new fast food restaurants in South LA. *Health Affairs* November/December 28:6, w1088-w1097.
- Thaler, R. and C. Sunstein. 2008. *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
- USDA and USDHHS. n.d. Dietary Guidelines for Americans, 2010. <http://www.cnpp.usda.gov/DGAs2010-PolicyDocument.htm>.
- Variyan, J. and J. Cawley. 2006. Nutrition labels and obesity. National Bureau of Economic Research Working Paper 11956.

- Ver Ploeg, M., V. Breneman, T. Farrigan, K. Hamrick, D. Hopkins, P. Kaufman, B-H. Lin, M. Nord, T. Smith, R. Williams, K. Kinnison, C. Olander A. Singh, and E. Tuckermanty. 2009. Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences: Report to Congress. USDA ERS Administrative Publication AP-036.
- Ward, C. 2010. Assessing competition in the U.S. beef packing industry. *Choices* 25.
- Wilde, P.E. 2011. Food security policy in developed countries. In *The Oxford Handbook of the Economics of Food Consumption and Policy* (Jason Lusk and Jutta Roosen, eds.). Oxford University Press.
- Wilde, P.E., and J. Llobrera. 2009. Using the Thrifty Food Plan to assess the cost of a nutritious diet. *Journal of Consumer Affairs* 43:2, 374-304.
- Wilde, P.E., L. Troy, and B. Rogers. 2009. Food stamps and food spending: An Engel function approach. *American Journal of Agricultural Economics*, 91:2, 416-430.
- Yen, S.T., M. Andrews, Z. Chen, and D.B. Eastwood. 2008. Food Stamp program participation and food insecurity: An instrumental variables approach. *American Journal of Agricultural Economics* 90:1, 117-132.