

# Increasing fruit and vegetable intake by changing environments, policy and pricing: restaurant-based research, strategies, and recommendations<sup>☆</sup>

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## Abstract

**Background.** Restaurants are among the most important and promising venues for environmental, policy, and pricing initiatives to increase fruit and vegetable (F&V) intake. This article reviews restaurant-based environmental, policy and pricing strategies for increasing intake of fruits and vegetables and identifies promising strategies, research needs, and innovative opportunities for the future.

**Methods.** The strategies, examples, and research reported here were identified through an extensive search of published journal articles, government documents, the internet, and inquiries to leaders in the field. Recommendations were expanded based on discussion by participants in the CDC/ACS-sponsored Fruit and Vegetable, Environment Policy and Pricing Workshop held in September of 2002.

**Results.** Six separate types of restaurant-based interventions were identified: increased availability, increased access, reduced prices and coupons, catering policies, point-of-purchase (POP) information, and promotion and communication. Combination approaches have also been implemented. Evaluation data on these interventions show some significant impact on healthful diets, particularly with point-of-purchase information. However, most published reports emphasize low-fat eating, and there is a need to translate and evaluate interventions focused on increasing fruit and vegetable intake.

**Conclusions.** Several models for changing environments, policy and pricing to increase fruit and vegetable availability, access, attractiveness and consumption in restaurants have been tested and found to have some promise. There is a need to evaluate fruit and vegetable-specific strategies; to obtain data from industry; to disseminate promising programs; and to enhance public-private partnerships and collaboration to expand on current knowledge.

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**Keywords:** Restaurants; Fruits and vegetables; Nutrition; Environment; Policy; Pricing

## Introduction

Recent national and international dietary guidance recommendations highlight the importance of increased fruit and vegetable consumption, along with eating lower-fat diets, for chronic disease prevention and general good health [1–3]. However, many people do not follow these guidelines, and there is a great public health need for prevention strategies to promote healthy dietary habits among Americans.

The knowledge base about strategies for promoting healthy nutrition is heavily weighted toward individually

oriented behavioral and educational approaches. Dietary change interventions directed toward individuals and groups have been widely studied, and the majority of well-designed studies of interventions to increase fruit and vegetable (F&V) intake have been shown to achieve significant increases in F&V intake [4]. There are fewer reports and studies that address predominantly environmental, policy, and/or pricing interventions to encourage healthy eating. There is great potential for such interventions in restaurants, and a need to identify the state-of-the-art, promising programs, and related research needs.

The “restaurant” category, as referred to in this article, is broadly defined. It includes full-service restaurants, fast-food restaurants, food courts, cafeterias (e.g., worksites, hospitals, schools), lunch wagons or “trucks,” deli counters, take-out food sources (including vending machines), bars

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and coffee shops that serve food, and food service businesses and catering services.

The strategies, examples, and research reported here were identified through an extensive search of published journal articles, government documents, the internet, and inquiries to leaders in the field. Because the nature of the current published literature does not warrant a quantitative review approach, this review provides illustrative examples, summaries of literature reviews, and bibliographic sources. Recommendations were expanded based on discussion by participants in the Fruit and Vegetable Environment, Policy, and Pricing Workshop held in September of 2002, sponsored by the Centers for Disease Control and Prevention and the American Cancer Society. More details about the research methods used in studies described here can be found in another article in this special issue [5].

### Rationale for restaurant interventions

Restaurants are among the most important and promising venues for environmental, policy, and pricing initiatives to increase fruit and vegetable intake. The increasing popularity of dining out over the past two decades has raised the proportion of nutrients obtained from away-from-home food sources [6]. Away-from-home foods typically contain more fat and saturated fat and less fiber, calcium and iron than foods prepared at home [6], so there is clearly room for change toward more healthful foods. Expanding portion sizes appear to be contributing to the obesity epidemic [7], although portions of fruits and vegetables have not been shown to be getting larger. In school cafeterias, greater availability of fruits and vegetables (F&V) has been asso-

ciated with higher F&V consumption among youth [8] and changes in cafeteria foods have also influenced health risk factors [9].

### Restaurant-based environmental, policy, and pricing interventions

Environmental, policy, and pricing interventions for F&V are those efforts that aim to improve the health of all people through better nutrition, not just small groups of motivated or high-risk individuals [10,11]. They reach populations by influencing availability, access, pricing, promotion, and information about F&V. Policy and environmental approaches may have greater impact when they influence the overall environment, reach many people, and are less costly and more enduring than clinical, individually oriented, or small group educational interventions [10].

Six distinct types of restaurant-based environmental, policy, and pricing interventions can be identified: (1) increased availability, (2) increased access, (3) reduced prices and coupons, (4) catering policies, (5) point-of-purchase (POP) information, and (6) promotion and communication. A further type of intervention involves community-driven health promotion in restaurants, which typically combines increased availability with information and promotion. For each type of intervention, both a general working definition and a “fruit-and-vegetable-specific” (F&V) definition are provided in Table 1; descriptions and examples of published and/or evaluated interventions are provided for each type of intervention in the following section. Notably, many of the published reports focus on reduced-fat or “heart healthy” menu items; we later discuss the potential to translate knowledge and

Table 1  
Types and definitions of restaurant-based environmental, policy and pricing interventions

Term	Definition	Fruit- and vegetable-specific definition
Increased availability	To offer healthful foods through more targeted menu items, more or less of certain foods/nutrients in menu choices; greater variety of healthful foods that are made available more often	To offer more types of F&V <sup>a</sup> , more F&V in mixed dishes, and healthier preparation of F&V menu options
Increased access	To make healthful menu items easier to locate, and taking healthy food choices “to the people”	To make F&V menu options easier to locate, offering F&V on lunch/snack wagons, and serving F&V side dishes and entrees more consistently at multiple locations
Reduced prices and coupons	To reduce price or provide discount coupons for F&V-rich menu items in restaurants	To reduce price or provide discount coupons for F&V-rich menu items in restaurants
Catering policies	A policy that requires or dictates that healthy food choices and healthy preparation methods are standard for catering events, functions, and food service operations	A policy that requires or dictates a minimum amount of F&V among the menu choices at catering events, functions, and in food service operations
Point-of-purchase (POP) information	Restaurant menus and/or signage identifies healthful food choices, based on established criteria	Restaurant menus and/or signage specifies food items that are good F&V choices, ideally listing the numbers of servings/order, based on established criteria, such as 5-A-Day
Promotion and communication	Advertising, posters, and other communication media (e.g., table tents) used to announce and encourage consumption of healthy food choices	Advertising, posters and other communication media (e.g., table tents) to announce and encourage consumption of specials (including price reductions, new menu items, modified recipes, etc.) on F&V-rich items

<sup>a</sup> Fruit and vegetable.

experience with lower-fat food promotion to promotion of fruits and vegetables.

#### *Increasing availability*

Interventions to increase availability of healthy foods (Table 1) may include preparation for providing healthier foods, such as nutrition training for chefs. For increasing availability of fruits and vegetables, restaurants may provide more types of F&V, as well as healthier preparations of F&V menu options including non-fried choices and F&V without high-fat sauces.

Examples of increasing the availability of healthy choices in restaurants have been reported in the United States and internationally. As part of Project LEAN (Low-Fat Eating for America Now), a training program for chefs, was implemented to increase healthy menu choices by focusing on improved taste and empowering the chefs [12]; however, no outcome data were reported. One study of modifying recipes and providing nutrition information in a restaurant in the United Kingdom found that increasing the number of reduced-fat menu items increased healthy choices, but that there was no effect of nutritional information alone on diet [13].

Several multi-component programs that aim to increase the availability of healthful foods in restaurants have been reported. Paul and others described the “Dine to Your Heart’s Content” program in Virginia and the reactions of patrons and restaurateurs. The main program components were: (1) preparing foods with less fat, cholesterol, sodium; (2) identifying healthy menu items; and (3) promotion of targeted menu items to consumers and restaurateurs. There was a high level of interest among patrons and managers; however, no data about the program’s impact on food choice behavior were reported [14]. Lower-fat menu items have also enhanced restaurants’ images [14,15].

#### *Increasing access*

Increasing access to healthful foods is a second type of intervention, beyond merely increasing availability (Table 1). Serving fruits and vegetables in multi-location restaurants (including fast food outlets) or servings more F&V side dishes and entrees are examples of restaurants providing more healthful choices that are easily accessed by the general public. Although no reports of naturalistic strategies to increase access could be found, one study reported on two short-term experiments in a college cafeteria. The study manipulated the “effort” needed to obtain specific food items as a possible way to reduce unhealthy foods, and found that increased effort reduced candy and potato chip consumption [16]. An interesting corollary to these findings might be to determine if reducing effort in to obtain F&V in cafeterias and restaurants would increase F&V intake.

#### *Reduced prices and coupons*

Offering discount coupons for F&V-rich menu items has been shown to be an effective strategy to encourage consumption of these foods in certain venues. The CHIPS study examined the effects of pricing and promotion strategies on purchases of low-fat snacks from vending machines in school and worksite settings. Increasing price reductions (of 10%, 25%, and 50%) were associated with significant increases in low-fat snack sales; promotional signage was weakly associated with increases in low-fat snack sales. Importantly, average profits from the vending machines were not affected by the interventions [17,18]. Up to now, no price modification interventions for F&V in full-service restaurants or cafeterias have been reported in the literature.

#### *Catering policies*

Catering policies require that healthy food choices (such as F&V) and healthy preparation techniques are standard for providing foods at events, functions, and food service operations (Table 1). An example of a catering policy is the Heartbeat Award Scheme in the United Kingdom, which requires one-third of all menu items to be “healthy choices” [19,20]. A study of the Heartbeat Award Scheme found that employees whose workplace cafeterias had the program were more aware of healthy eating and said it was easier to eat a healthy diet at work with the program [21]. Another example of a catering policy was the policy of the Produce for Better Health Foundation at an industry conference in 2002, in which the policy required that every meal included F&V in abundance [22].

#### *Point-of-purchase (POP) information*

POP information interventions in restaurants and cafeterias have been studied for several decades, and have yielded favorable effects [11,23,24]. These efforts have been implemented in a variety of cafeteria/restaurant settings, often in combination with posters, labels, and/or nutrition games. Some of the interventions also used incentives and monetary rebates. Across studies, increased sales of most targeted items were achieved [25–34]. The main foci of those interventions that were reported were fat and calories, and a few included F&V. Most of the studies were evaluated for short-term effects, ranging from 4 to 15 weeks in duration [23,24].

#### *Promotion and communication*

Restaurant-based promotion and communication strategies include advertising, posters, and other communication media (e.g., table tents) used to announce and encourage consumption of healthy food choices, such as F&V (Table 1). Promotional events such as price reductions, new menu

items, and modified recipes are commonly used. Promotion and communication are most often included as part of broader community-driven health promotion activities in restaurants.

#### *Community-driven health promotion in restaurants*

Many programs that fall into this category have been reported, and their goals usually include both increased availability and promotion and communication. Examples include the U.K. Heartbeat Award Scheme [19–21], the Winner's Circle Healthy Dining Program in North Carolina [35], the Ottawa-Carleton Heart Beat Restaurant Program in Canada [36], and the Australian program for Healthy Food Choices in Licensed Premises [37]. Such programs are often multi-component and address other health behaviors in addition to nutrition. For example, the Heartbeat Award Scheme requires that at least one-third of menu items be “healthy choices,” and also that at least one-third of seating be nonsmoking and more than a third of the food service staff be trained in food safety. The use of audit systems revealed that more healthy menu choices were offered in “Award” locations [19,38], but there are no data on consumer behavior associated with the program.

#### **Translating low-fat interventions for fruit and vegetable promotion**

As mentioned earlier, the large majority of restaurant-based environment, policy, and pricing interventions for healthy eating emphasize lower-fat foods, and in some cases foods lower in calories and/or sodium. As some of the availability-enhancing and point-of-purchase interventions have been reasonably successful, it is important to evaluate whether these interventions can be equally successful if they focus on fruits and vegetables.

There are several key differences between a low-fat focus and promotion of fruits and vegetables. For example, the information that a food is high in F&V may be less novel than information about fat content. Short-term risk factor reduction achieved by increasing F&V intake is less likely to be visible than lower cholesterol or weight loss that could be achieved by fat reduction. The efficacy of some individually oriented interventions on F&V, such as tailored messages [4], points to these questions. The price elasticity question in F&V consumption, addressed in the papers by Ballenger and McLaughlin (references to other papers), raises questions about whether price reductions will affect net F&V intake. Finally, the questions of maintenance of restaurant-based interventions and sustainability of these environmental changes have not been addressed well, with most evaluated programs lasting for less than 6 months. Factors that contribute to the institutionalization of the restaurant-based intervention changes

should be identified and used in the design of new interventions.

#### **Gaps in knowledge and research priorities**

Research is just beginning to describe health-behavior environments (e.g., Ref. [39]) and to test the hypothesis that environmental variables are empirically correlated with health behaviors and risk factors. There are several important gaps in knowledge about dietary behavior, and fruit and vegetable consumption, in restaurants. For example, there is limited information on the descriptive patterns of eating out in relation to population demographics (proximity, type and availability of restaurants), and the role of coffee shops—a growing category of eating out—in contributing to meals and overall daily food intake. The effects of labeling in relation to fruits and vegetables in restaurants have not been well studied. There is a need to better define and measure restaurant environments, including the amount of vegetables/fruits per serving and how to assess mixed-food recipes that also include fat, sugar, and salt. Other limitations in the literature include the lack of data on the influences of environmental changes in restaurants on individual health behaviors over time; the sustainability of these interventions and factors associated with maintenance of environmental changes; what foods are displaced (if any) when new offerings for F&V are added to a restaurant menu; difficulty of implementing strong study designs; and lack of interventions in restaurants serving low-income communities.

To address these gaps in knowledge, both demonstration projects in communities and basic research on restaurant eating patterns are needed. Conducting rigorously designed studies in restaurants can be difficult and expensive. Often, multiple units must be used to obtain adequate statistical power, as well as efforts to ensure fidelity of the interventions. In addition, restaurants are a place of business, and so interventions need to be designed that are cognizant of the concerns of the business owner. It is especially important to better understand the impact of environmental strategies within multi-strategy programs. Ongoing synthesis of completed and in-progress research would help identify the newest knowledge and disseminate findings about promising and successful strategies.

Data from industry can play important roles in advancing our understanding of these issues. Marketing and sales data from industry partners can help reveal whether offering healthier choices leads to higher fruit and vegetable consumption among restaurant patrons. Surveys of restaurants regarding owners' and managers' concerns about increasing offerings of fruit and vegetables on their menus would also provide insights into potential opportunities for environmental, policy and pricing strategies; information about what foods are displaced when fruits and vegetables are added to the menu; and potential ideas for institutionalization of these strategies.

Many restaurant chains and most fast food restaurants now publish their menus and nutrient values, and major fast food chains publish nutritional information on the internet. There are currently many available books that publish detailed nutrition information for restaurant chains, which go well beyond fast food outlets; and they are frequently updated [40–42]. Analysis of these information sources can contribute to our understanding of restaurants' provision and promotion of fruits and vegetables, as well as highlight preparation methods that increase fat and sodium consumption.

A final, important area of research relates to better understanding the extent to which environmental changes lead to individual changes toward healthier eating. There is emerging evidence that more motivated subgroups may account for most of the change in aggregate-level environmental impacts (e.g., Ref. [43]) and that higher-need groups, such as low-income populations, may not be equally influenced by such structural changes.

### Promising programs

Several promising programs and initiatives were endorsed by the discussion group and recommended for further evaluation. Development of more fruit/vegetable-rich dishes in restaurants, catering programs, and for meeting planners is likely to encourage consumption. Increasing the attractiveness of "F&V cuisine" might also have a positive impact, especially in going beyond a focus on vegetarian meals. Providing convenient containers for taking-away leftover fruits and vegetables would encourage diners to eat them as snacks or for later meals. Institutional policies to require or support these types of innovations would promote implementation.

Other efforts worth trying include menu labels showing the number of servings of fruits and vegetables in food products, particularly a "5-A-Day" sticker based on the contribution of an entree menu item to total servings of fruits and vegetables. Such stickers could be placed on menus or at the point-of-purchase in cafeterias. This idea could be taken further to provide a "seal of approval" for entire restaurants where customers will easily find fruit/vegetable-rich food choices.

Additional ideas include the distribution of convenient individual-serving packets in food service operations on airlines, at schools, and in chain restaurants and cafeterias. Cross-promotion of fruits and vegetables as "value meals" (instead of adding, e.g., more French fries or chips) would encourage higher consumption, as would price subsidies for fruits and vegetables. Examples of strategies that are in place which might prove effective include some chain restaurant innovations, such as the low-fat "sub" sandwiches with vegetables (promoted by Subway restaurants), and the yogurt fruit parfaits now sold at McDonalds, provided they are also low in sugar.

### Partnerships and dissemination

Collaboration between the public and private sectors is an essential and promising environmental and policy approach to increasing fruit and vegetable availability, appeal, and consumption in restaurants [44]. Emerging partnerships include the Centers for Disease Control and Prevention (CDC) working with McDonald's, and the "HHS Fast Food Leaders." Universities and government tourist bureaus can cooperate with local franchises, the National Restaurant Association, and local culinary institutes to demonstrate leadership in offering and promoting healthful meals. Restaurant suppliers are another important collaborator, including the Institutional Food Service Distribution Association (IFSDA) and Fresh Express. Finally, both professional organizations and networks (such as the Food Service Professionals' Network) and voluntary health associations (e.g., the American Cancer Society, American Heart Association, and American Diabetes Association) are well positioned to sponsor and support restaurant-based fruit and vegetable promotion initiatives.

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