

**INVOLVING RETAIL GROCERS IN THE
OBESITY EPIDEMIC**

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Obesity is a national health crisis that demands immediate action from multiple stakeholders, both within and outside of traditional health domains. As interventions are developed to address this epidemic, this paper serves as a resource of public health importance as it discusses potential roles that retail grocers can play to improve national nutrition. By synthesizing literature from the health and marketing fields as well as publications from the grocery industry, three primary recommendations are presented: Contribute to nutritional assessments, influence dietary choices in the retail setting, and partner with local stakeholders. Additionally, the Social Ecological Theory is applied as a guiding framework to evaluate and plan grocery store interventions. Suggestions for future research and next steps are also provided. This report is potentially useful for health professionals interested in community nutrition and for store operators concerned with their store's image and meeting their customer's needs.

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1. THE OBESITY EPIDEMIC DEMANDS PARTNERSHIPS

Weight gain happens when people eat more calories from food than they expend through metabolic processes and physical activity. Body Mass Index (BMI) is a tool to assess an adult's weight status based upon his or her height and weight. A person is considered overweight if his BMI is between 25 and 30, while an obese person has a BMI of 30 or greater. Health professionals agree that obesity is a major public health issue for Americans, but the concern is not merely over expanding waistlines (Hearne, Segal, Unruh, Earls, & Smolarcik; Wing et al., 2001). The seriousness of the problem lies in the ample evidence linking obesity with an increased risk of serious conditions such as high blood pressure, type II diabetes, coronary heart disease, stroke, osteoarthritis, sleep apnea, respiratory problems, and some types of cancer (CDC, 2000; Wing et al., 2001). These health problems, although numerous and severe, do not fully illustrate the consequences of obesity; the condition also impacts psychological well being, longevity, and quality of life of those affected (Kolotkin, Meter, & Williams, 2001). Additionally, it has become the costliest epidemic in America with obesity-attributable medical costs and productivity losses totaling \$117 billion in 2000 (HHS, 2001).

National trends over the past several decades reveal the extent of this epidemic. Presently, sixty-four percent of adults are either overweight or obese¹. Shockingly, the percentage of obese adults, 20-74 years of age, has doubled over the last 20 years from fifteen to thirty percent. Prior to 1980, these numbers were relatively static (CDC, 2003). Additionally, about fifteen percent of adolescents aged 6-18 are overweight, and overweight young people are more likely than children of normal weight to become overweight or obese adults (CDC, 2005). At the state and county levels, about sixty percent of Pennsylvania adults and fifty-six percent of Allegheny County adults are overweight or obese² (PA Dept. of Health, 2005).

¹ Based on NHANES data, 1999-2002

² Based on BRFSS data, 2001-2003

Even though obesity is a widespread problem with severe consequences, disparities in diet related diseases are evident in many segments of the population. It is well documented that obesity has been and continues to be more common in women, particularly if they are of low socioeconomic status (CDC, 2000; Sobal & Stunkard, 1989), from certain minority groups-- African American, Hispanic, Native American, and Pacific Islander (CDC, 2000; Kumanyika, 1993) or living in food insecure households (Scheier, 2005; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). The concentration of overweight and obesity in minority groups and among persons of lower economic status creates somewhat of a paradox. Overweight and obesity are usually conceptualized as having been caused by eating too much food, but since they are also correlated with food insecurity among women of all ethnic groups, there may be other mechanisms at work. Food insecurity is the uncertainty of whether enough food to feed all members of the household can be acquired. While it is not the same thing as nutritional deprivation or hunger, the consequences of food insecurity can include increased body weight, decreased dietary intake, decreased household food supply, psychosocial dysfunction, decreased quality of life (Lee & Frongillo, 2001) and poorer nutritional outcomes (Bhattacharya, Currie, & Haider, 2004). However, the mechanisms and causality of this hunger-obesity paradox are not clear. Food insecurity may be contributing to the obesity epidemic or obesity may be causing food insecurity. Poorer Americans seem to eat improper amounts of calories, rather than obtaining insufficient calories overall (Bhattacharya et al., 2004).

1.1 DIETARY CAUSES OF OBESITY

Metabolic and genetic factors are not likely explanations for the drastic increase in prevalence since the contemporary human genome has changed minimally over the last 50,000 years (Saris et al., 2003). Underlying causes of the epidemic stem from a combination of environmental factors that encourage unhealthy lifestyle choices and behaviors related to both physical activity and diet (CDC, 2005; Wellman & Friedberg, 2002). An important dietary factor of the obesity epidemic is that Americans are eating more calories on a daily basis than they did several decades ago without simultaneously increasing their activity levels. Average daily caloric intake increased by nearly 25 percent or about 530 calories between 1970 and 2000

(USDA, 2002). The observed caloric increase can be attributed to larger portion sizes and to consuming higher calorie, less nutrient rich foods and beverages. The lack of importance placed on limiting caloric intake is most troublesome. Even among those who are “very concerned” or “somewhat concerned” about the nutritional content of what they eat, few consider calories to be an important factor (USDA, 2002).

However, there is more to diet quality than just counting calories. A healthy diet consists of fruits, vegetables, whole grains, fat-free or low-fat milk products and is supplemented by lean meats, poultry, fish, beans, eggs, and nuts. It is also recommended to limit intake of saturated and trans fats, cholesterol, salt, and added sugars (USDA, 2005). Meeting these nutritional guidelines has implications for BMI status and the obesity epidemic. For example, researchers (Ransley et al., 2001) found a positive relationship between BMI and dietary fat intake for both men and women when expressed as a percentage of energy. Additionally, among both adults and youth, increased fruit consumption has been linked to a lower BMI (Lin & Morrison, 2002). In contrast to fruit trends, adults eating more potatoes, the most common vegetable bought and consumed, tend to have a higher BMI (Lin & Morrison, 2002; Reed, Frazao, & Itskowitz, 2004). However, the consumption of other vegetables has a significant, negative impact on BMI for women. The weak correlation between vegetable consumption and BMI might be explained by the way many Americans eat vegetables: deep fried or topped with high-fat dressings (Lin & Morrison, 2002).

To assess the quality of the American diet, the USDA’s Center for Nutrition Policy and Promotion developed the Healthy Eating Index (HEI). The most recent index uses data from the National Health and Nutrition Examination Survey (1999-2000), and its components measure the degree to which a person’s diet conforms to: 1) Serving recommendations for each of the major food groups (grains, vegetables, fruits, milk, and meat); 2) Total fat consumption and saturated fat intake as percentages of total food energy; 3) Total cholesterol and sodium intakes; and, 4) Variety in a person’s diet. Each component has a maximum score of 10 for a combined HEI score of 100. A higher score indicates intakes closer to recommended ranges (Basiotis, Carlson, Gerrior, Juan, & Lino, 2002). There is evidence that the HEI is a valid marker of diet quality; individuals with a healthier body weight tend to score higher on the HEI and the difference is statistically significant for women (Mancino, Lin, & Ballenger, 2004).

Results from the HEI and other recent studies suggest that the American diet does not fare well. Only ten percent of the population met the USDA’s recommendations (score of 81 and above) while seventy-four percent were labeled “needs improvement” (score of 51-80). The remaining sixteen percent consumed a poor diet (score of 50 or less). There is evidence to suggest that diet quality varies in accordance with demographics. Males, non-Hispanic Blacks, people from lower SES households (Basiotis et al., 2002), and elderly people, especially women who live alone (DeWalt et al., 1990) tended to have a poorer quality diets than their counterparts. Surprisingly, no subgroup of the population was found to consume a balanced diet suggesting that most, if not all, Americans need to improve their food choices.

As shown in Figure 1, some HEI components fare better than others in terms of the percentage of the population conforming to dietary guidelines.

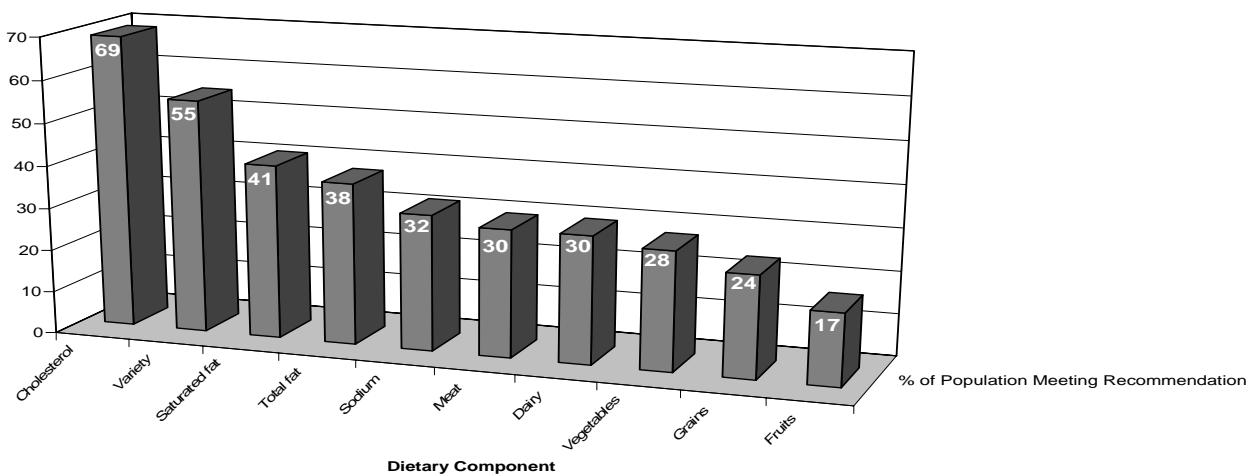


Figure 1. Likelihood of Meeting Dietary Recommendations

People are more likely to meet daily recommendations for cholesterol intake and including variety in their diet, but continued nutrition interventions, in and outside of the grocery setting, should focus on intake of total and saturated fat, milk, sodium, and especially on consumption of whole grains, fruits, and vegetables. While these trends are consistent for most segments of the population, disparities do exist, especially for fruit and vegetable consumption. Low-income families are less likely to purchase fruits and vegetables (Leibtag & Kaufman, 2003), in fact the difference can be as much as half in a given week when compared to households with higher income levels (Blisard, Steward, & Jolliffe, 2004). There is also evidence that African Americans eat fewer vegetables, drink less milk, and have higher cholesterol intakes when

compared to Caucasians (Morland, Wing, & Diez Roux, 2002; Reed et al., 2004). Thus, cholesterol should not be overlooked as a risk factor by grocery stores that serve an African American population.

Fortunately, trends over the last few decades reveal that people are increasingly concerned about dietary quality and are demonstrating an improved ability to make some dietary decisions (FMI, 2005). In comparison to 1989, people were more likely to meet recommendations for grain, total fat, saturated fat, cholesterol, and food variety in 1996, but there has been little improvement seen since then. In contrast, fewer people are meeting intake recommendations for sodium, milk, and meat and unfortunately, the relatively low consumption of fruits and vegetables has changed little since 1989 (Reed et al., 2004). Despite growing concerns over nutrition, efforts aimed to improve the American diet are needed now more than ever.

1.2 RETAIL GROCERS, SUPERMARKETS, AND GROCERY STORES

Public health professionals are searching for cost effective interventions that offer long-term success for preventing weight gain and promoting weight loss, especially among high-risk groups. Since obesity is not a personal disorder, but rather a social problem that demands immediate action, researchers suggest adopting a comprehensive approach that involves interventions targeted to individuals, interpersonal groups, communities, organizations, and governmental policies (Sallis & Owen, 2002). Even though consensus grows for such an ecological approach, more research is needed to fully understand, measure, and alter the “obesogenic” environment (Egger & Swinburn, 1997; Sloane et al., 2003). Despite these scientific uncertainties, learning about and changing relevant contextual factors will not be possible unless partnerships are formed outside of the health sector—with politicians, educators, city planners, and community leaders.

Industry, in particular, plays a vital role in the prevention of overweight and obesity by directly and indirectly influencing trends in nutritional quality and physical activity levels. It is possible for industry to encourage choices that promote the maintenance of a healthy or healthier BMI (HHS, 2001). While many industry sectors are relevant to halting this epidemic, this paper

focuses solely on retail grocers--stores selling a general line of food products, such as canned and frozen foods; fresh fruits and vegetables; fresh and prepared meats, fish, and poultry; and nonfood grocery products. Supermarkets, small grocery stores, and convenience stores fall under this heading, but this paper is mostly concerned with supermarkets and small grocery stores. Supermarkets are distinguished from grocery stores in that the former generates a sales volume of \$2 million or more annually (FMI, 2004). For simplicity's sake, the terms retail grocers, supermarkets, and grocery stores will be used interchangeably to refer to this target industry sector.

Interventions in the retail grocery setting hold tremendous potential for impact for several reasons. First, retailers play a significant role in the food industry. Consumers spent \$223 billion on food at retail stores in 1999. At this time, about 58 percent was spent at supermarkets, but by 2004 the share increased to 63 percent (USDA/ERS, 2005); De Walt et al, 2000). More importantly, it is estimated that consumers make an average of 2.2 weekly visits to a supermarket (FMI, 2004). Thus, the probability of reaching a large number of people with health promotion interventions is high. Secondly, interventions potentially offer a win-win situation for the store and its customers because, not only do nutrition programs improve public health, but interventions enhance the store's image among customers and may even increase store profits (Cassady & Mohan, 2004; Glanz & Yaroch, 2004; Steenhuis, van Assema, Reubsat, & Kok, 2004; Steenhuis, van Assema, van Breukelen, & Glanz, 2004). Identifying dietary components that can improve health and offer higher profits, like fresh produce, could be mutually beneficial (McLaughlin, 2004; NIH, No date given). Lastly, grocery stores provide more than food; they make lasting contributions to nearby communities in terms of economic development, infrastructure investments, and public health. As a local asset, they have great potential and responsibility to collaborate with customers and other stakeholders to improve nutrition.

Focusing solely on grocery stores does pose several limitations. A combination of both dietary and physical activity issues contribute to increases in BMI, but the emphasis for this report will be limited to the role of nutrition. Additionally, competition for the consumer's food dollar has intensified nationally and locally (Kaufman, 2002; Lindeman, 2006). Thus, if consumers are buying unhealthy foods, retailers may feel the need to provide it for them in order to stay competitive. However, adopting a health strategy may be one way to distinguish a store from its competitors since health promotion materials are positively received by customers

(Cotugna & Vickery, 1992). Lastly, Americans are increasingly eating out. The amount spent at restaurants, fast food places, and cafeterias increased from twenty-six percent of national food expenditures in 1970 to forty-three percent in 2004 (USDA, 2004). This trend holds true for most household types except the one-person household, but in general, the smaller the household, the larger the share of the food dollar spent away from home (Blisard & Harris, 2001). Unfortunately, away-from-home foods have been shown to contain more fat and saturated fat, provide less nutritional value (Lin, Guthrie, & Frazao, 1999), and serve larger portion sizes (Wellman & Friedberg, 2002) than foods prepared at home. Thus, away from home food is becoming increasingly important in determining the quality of US diets (Lin, Huang, & French, 2004).

Despite these limitations, the following pages lay out important information applicable to store operators who may be concerned about improving their store's image and meeting their customers' needs as well as to public health professionals interested in community nutrition. Chapter 2 documents the methodology employed to develop the proposed recommendations and the presented framework. A separate chapter is dedicated to each of the following roles that retail grocers can play in the obesity epidemic: Contribute to nutritional assessments, influence dietary choices in the retail setting, and partner with local stakeholders. Lastly, Chapter 6 offers suggestions for future research.

2. METHODOLOGY

This project's methodology relies on a retrospective literature review that synthesizes ideas and results from the health field as well as publications from the grocery industry to determine how food retailers can potentially aid in obesity prevention. A supplemental source of information comes from conversations and informal correspondence with individuals involved in the grocery industry. A total of 328 references were obtained and together, these sources provide the basis for the recommended roles and development of the hypothesized framework presented in Chapter 4.

2.1 REVIEW OF FACTORS INFLUENCING FOOD CHOICE

Background information related to the dietary contributors of weight gain prompted a review of the influencers of food choice, in attempt to understand why people make poor dietary decisions. This review was conducted in December of 2005 using PubMed, PittCat, and the websites of the USDA and the Food Marketing Institute (FMI). Search criteria was not limited by time period and subject and keywords included "food choice/s," "dietary intake," "food shopping purchases," and "food shopping behaviors". Results were sorted by relevance based upon content of the abstract and downloaded or manually entered into EndNote 8.0. The theoretical basis and results were summarized for the relevant articles and books. From this summary, common themes related to personal and social influences, economic resources, and environmental factors were identified as important to food choice, which were used to organize the literature related to grocery store interventions.

2.2 CONVERSATIONS WITH SUPERMARKET PERSONNEL

Between December 2005 and January 2006, informal communication took place between the primary investigator and representatives from store management and the corporate affiliates of a recently re-opened store in Pittsburgh, PA. Three phone conversations and one in person meeting took place with corporate staff and three in-person conversations took place with store management. The purpose of these communications was to better understand how grocery stores operate and how they track customers' purchases. Notes were documented for each encounter.

2.3 REVIEW OF GROCERY STORE INTERVENTIONS

A bibliography based on a PubMed search conducted in April 2003 using the terms "grocery/ies" and "supermarket/s" was updated as of January 2006 and supplemented with citations from an Ovid search using the same terms. Articles related to occupational health, shopping and food safety, and genetically modified organisms were omitted. A second source of interventions came from the articles' bibliographies and several additional studies that seemed worthy of further investigation were added to the EndNote file. Publications from the websites of FMI and Progressive Grocer were also accessed. Lastly, multiple terms such as "grocery store," "supermarket," "health," "health promotion," "nutrition," and "obesity" were entered into the internet search engine, Google. No formal inclusion criteria was used when choosing references because it was decided to get an overview of the types of interventions that have taken place in the retail grocery setting nationwide. However, preference was given to studies that incorporated an evaluation component. A total of 20 articles were reviewed and are included in Appendix A. Interventions were organized by the themes identified from the food choice review and the categories of nutritional data and local stakeholders were added.

2.4 DEVELOPMENT OF INTERVENTION FRAMEWORK

With such a large number of references, it was necessary to rely on both theory and existing frameworks to help organize the literature and evaluate how well supermarket nutrition interventions are currently designed. Concepts from the Social Ecological Theory were incorporated, particularly its philosophy that behaviors are influenced by an interaction of personal, intrapersonal, socio-cultural, policy, and physical-environmental factors. In order to decide which factors are most relevant to interventions in the retail grocery setting, three sources were used: 1) Categories identified from the food choice review; 2) Logic framework presented by Centers for Disease Control's Community Guide for Nutrition (CDC, No date given); and, 3) Unpublished framework presented by a researcher from the School of Population and Health, Newcastle University (White, 2005). These sources were adapted and the framework that ultimately evolved is presented in Figure 2. This hypothesized model has not yet been tested in the retail grocery setting.

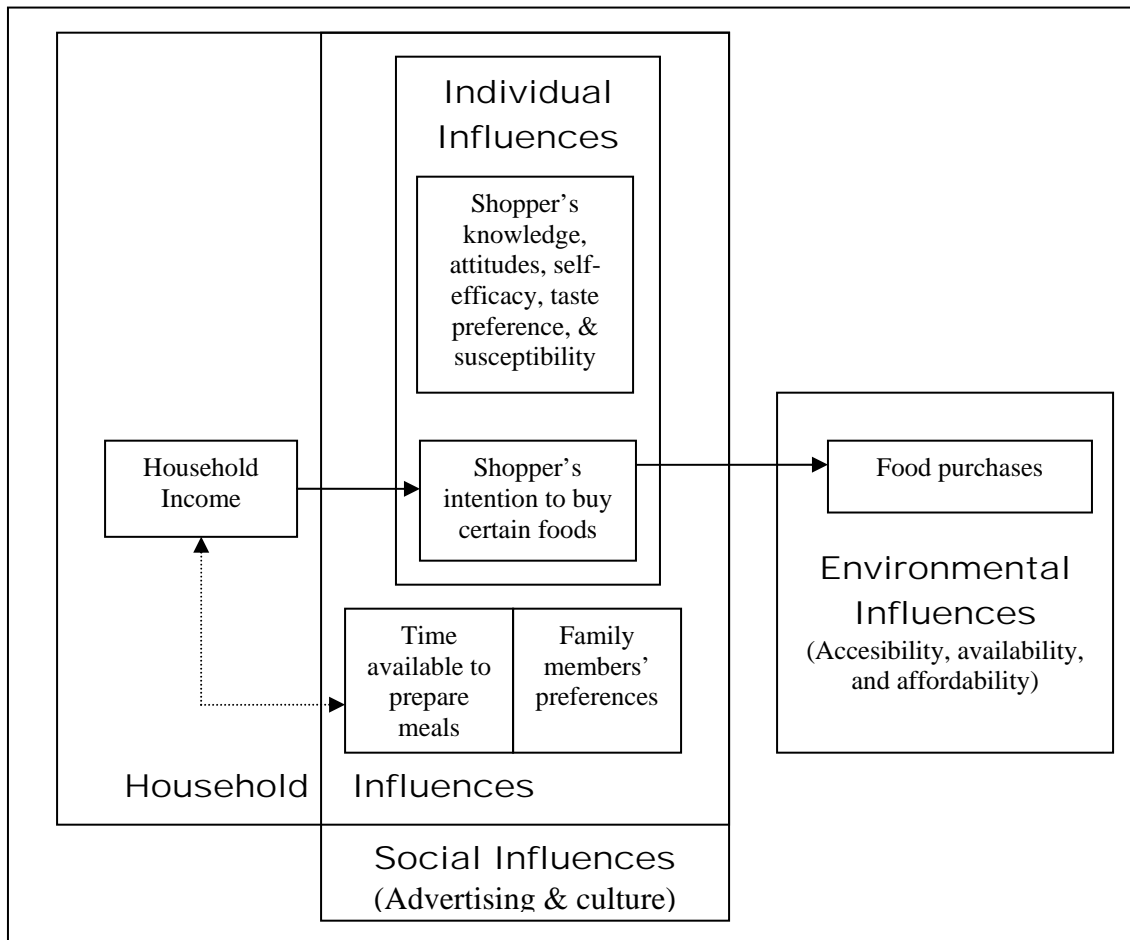


Figure 2. Nutrition Intervention Framework for Retail Grocers

3. CONTRIBUTE TO NUTRITIONAL ASSESSMENTS

The first recommended role of retail grocers relates to improving nutritional surveillance. In addition to the HEI and National Health and Nutrition Examination Survey, there are other current attempts to monitor what Americans are eating including the Continuing Survey of Food Intakes by Individuals (CFSII), Nationwide Food Consumption Survey (NCS), Total Diet Survey, Health and Diet Survey, and Diet and Health Knowledge Survey (DHKS). These assessments quantify dietary patterns, household income and food expenditures, and/or individual's nutritional intake. They typically utilize large-scale, diet-recall surveys and/or food diaries and rely on large sample sizes. Unfortunately, there are significant limitations of this methodology. The validity and reliability of the diet recall approach have been questioned because people routinely underestimate their usual dietary intake (Anderson, Winett, & Wojcik, 2000), and problematically, this underestimation tends to be greater among obese people (Nestle et al., 1998). Thus, it is difficult to obtain an accurate assessment of dietary patterns, and even more difficult to compare results of healthy weight individuals with obese individuals. These instruments also tend to be expensive when a representative sample of all members of a population are surveyed (Anderson et al., 2000). In instances when surveys are used for evaluative purposes, survey costs can exceed the costs associated with the program itself (Cheadle et al., 1995). While the diary method tends to have less underreporting, offers lower implementation costs, and easier inclusion of large sample sizes, challenges consist of non-response, respondent burden, and the loss of information because of the tediousness of recording all purchases (DeWalt et al., 1990). As a result, valid and reliable surveillance data continues to be an important goal of researchers trying to understand the contributing dietary factors of the obesity epidemic (Glanz, 1999; Van Wavé & Decker, 2003).

Grocery stores have access to three major data sources--supermarket sales, household receipts, and marketing data--that can overcome some of the limitations of traditional research methods. The benefits of using these data are that they are a convenient, objective, and relatively

non-intrusive approach to assess food purchases and shoppers' nutrient consumption (Ransley et al., 2001). Unfortunately, researchers have mentioned proprietary issues and corporate policies as barriers to accessing these data types (Abarca & Ramachandran, 2005; Kristal, Goldenhar, Muldoon, & Morton, 1997). Grocery stores could make a significant contribution to improving the quality of nutritional assessments on both national and local levels if this information were more freely shared. Applications of such data include:

- Compare the frequency of purchases for products linked to positive or negative health outcomes within and between populations.
- Validate food intake instruments, such as food frequency surveys or pantry inventories, by comparing actual food purchases with survey or recall records over time.
- Evaluate population-based interventions focusing on changing food and nutrition habits over time.

Even though retail stores are a major source of food purchases, foods purchased for home consumption may not accurately reflect a person's or household's total diet because approximately 25% of caloric intake comes from meals and snacks consumed away from home (Van Wave & Decker, 2003) and about 40% of a household's food budget is spent on away from home foods (USDA, 2004). Other confounders include food produced within the home, gifts, food entering the household through commodity programs (DeWalt et al., 1990), and waste (Ransley et al., 2001). Additionally, since people shop at a variety of stores to meet their food needs, targeting one or a few grocery stores may not be sufficient to fully assess the community's diet. Thus, it is important to know shopping patterns and how much of the food dollar is spent at the different types of retail settings such as farmer's markets, convenience stores, supercenters like Wal-Mart, and the typical supermarket.

One of the biggest challenges in using such data is deciding upon which items to analyze. The average supermarket holds about 50,000 food items from a marketplace containing over 320,000 packaged food and beverages items (Nestle, 2002). Choosing among these possibilities will be based upon the purpose of the data analysis. In some cases, public health professionals or community representatives may be interested in monitoring a specific food item like fruit, but there are many types of fruit (apples, oranges, bananas) served in a variety of forms (fresh, canned, frozen, bottled juice, frozen juice, etc) in multiple brands (Dole, Del Monte) and sizes (20 oz., quart, gallon). These choices are important because one study (Demark-Wahnefried et al., 1999) found a discrepancy between self-reported intake of fruit and vegetable servings and sale ratios of fresh fruits and vegetables. It was determined that the self-reported increase was

largely due to increases in fruit juice, which was not analyzed. Thus, choosing the correct items to analyze will have a significant impact on program evaluation or dietary assessment. In other cases, there may be interest to compare foods that have a distinction between a healthy and unhealthy option such as higher and lower fat content (milk) or high and low calorie servings (soda) (Abarca & Ramachandran, 2005). Researchers might also be interested in more than one product type like all dairy products, which could include milk, cheese, and yogurt. To aid in these efforts, the Food and Drug Administration has a list of 57 product groups that can be used as a stratified sampling frame to randomly select items (Strychar, Potvin, Pineault, Pineau, & Prevost, 1993).

Another common challenge is deciding when and for how long the data will be collected. Most families shop in 1-2 week cycles (DeWalt et al., 1990) and shopping frequency varies during the day and week with more shopping trips occurring on weekends than weekdays (FMI, 2005). Plus, fruit and vegetable consumption and meat purchases typically display seasonal and/or holiday variations (Demark-Wahnefried et al., 1999; USDA, 2003). To avoid problems of seasonality, studies have used a 12 month span of data collection (Den Hond, Lesaffre, & Kesteloot, 1995), but if time is limited, other methods ranged between 2-10 weeks, with 8 weeks being appropriate (Cieslak, 2006; Rankin et al., 1998). Regardless, of the period chosen, there typically are substantial weekly variations in purchases, which make data analysis difficult. Thus, the selection of the time interval could be critical to the interpretation of the data (Ernst et al., 1986).

Despite these challenges, each of the three grocery store data types provides slightly different information, and the strengths and weaknesses of each will be presented.

3.1 SALES DATA

Most stores have access to sales data from their reporting systems so this is the most accessible source of the three data types. However, this accessibility also makes it less sensitive because it is aggregated at the store or department level, as percentages of department or total sales. Calculating a product ratio can be problematic, since many factors can affect either the sales of the item of interest (numerator) or total sales (denominator) (Demark-Wahnefried et al.,

1999). Additionally, it is also not possible to determine whom or even how many people purchased the targeted items. Despite these limitations, sales records provide the ability to: 1) Describe the types of products purchased within food categories; 2) Rate the demand for specific healthy food items; 3) Compare the demand for less healthy food items with healthier alternatives; and, 4) Compare sales based on region and/or time to find patterns and variations. In some cases it might be most appropriate to base the comparison on sales, but for perishable items like fruit and meat, analysts could also use total volume sold.

An advantage of this data type is that one can choose large numbers of products to analyze because percentages are easily calculated. One study (Den Hond et al., 1995) collected sales figures for 103 brand products of spreading and cooking fats from 110 stores over a twelve month period. While another study (Ernst et al., 1986) included sales figures for 246 food items. However, for the purposes of evaluation of community or store interventions, this approach may be too insensitive (Demark-Wahnefried et al., 1999). No differences were found in sales after a yearlong grocery store intervention (Ernst et al., 1986) suggesting that individual level data such as receipts or marketing cards may be a more sensitive measure of intake.

3.2 RECEIPT DATA

Receipt data have been found to be useful for evaluative and assessment purposes (Anderson et al., 2000; Ransley et al., 2001), but there are drawbacks. First, personnel are needed for substantial data entry. Secondly, the limited description on receipts makes it difficult to distinguish among items. One estimate finds that 85 percent of items could be clearly labeled, while the remaining items either needed to be annotated by the shopper or received default nutritional or size information based on mean values of the food item. Lastly, bias is also possible if the selected individuals providing the receipts change shopping habits because they know they are being studied (Rankin et al., 1998).

Even with these limitations, receipt data have been demonstrated as a feasible and flexible methodology (Rankin et al., 1998). For example, one study recruited participants from five large supermarkets to submit food receipts over a 10 week period (Anderson et al., 2000). A second study collected receipts and food logs of items purchased and eaten for a sample of 50

families over a two week period (DeWalt et al., 1990). While another study collected receipts from 214 households over a 4 week period (Ransley et al., 2001). These examples demonstrate flexibility in data collection. Additionally, collection of receipts involves subjects, and thus it is possible to gather supplemental data such as BMI status, attitudinal surveys, food intake amounts, and tracking away from home food purchases. It is also possible to add demographic data, such as race and household income, which store marketing data typically does not include. This method offers other obvious benefits over sales data. For example, annotated food shopping receipt data can provide an objective, sensitive measure of dietary behavior of individual and household food purchases (Anderson et al., 2000). Thus, it is possible to identify problem food groups for specific segments of the population and plan a targeted nutrition intervention. After the intervention is in place, it is also possible to track changes in shopping patterns to evaluate program effectiveness (Rankin et al., 1998).

Receipt data also make it possible to conduct a nutritional analysis using resources like the Supermarket Foods Database or those provided by food producers and manufacturers. When choosing or creating the reference database, it is important that nutritional values of the supermarket foods list items as consumed, not as purchased. Once the database is chosen, items and amounts from the receipts are coded and then cross-referenced with it (Haralson, Sargent, & Schluchter, 1990). The analysis should also take into account cooking, refuse, children, meals eaten out, and meals eaten by visitors (Rankin et al., 1998; Ransley et al., 2001). While this process involves advanced statistical analysis, it is a cost-effective way to obtain useful information relating to individual and household nutrition for targeting efforts to reverse the obesity epidemic.

3.3 MARKETING DATA

Many stores offer loyalty programs that provide customers with a card that itemizes purchases and tracks their total spending for each transaction. As customers spend more, they receive a variety of incentives such as discounts on frequently purchased items, bonus points that can be redeemed for consumer products, or discounts on gasoline. These programs give supermarkets a competitive edge because they learn a great deal about their customers'

purchases and habits. Unfortunately, few stores utilize these data to the extent possible (Lindeman, 2005), especially from the perspective of nutritional analysis. ACNielsen, a global marketing research firm, exemplifies how marketing data can be collected nationally. ACNielsen Homescan captures purchase information of all consumer packaged goods (from all retailers not just grocers), as well as non Universal Purchase Code (UPC) identified perishable products in over 240,000 households in 26 countries (Nielsen, 2006). Similar to receipt data, linking survey results with household purchase information reveals many of the whys surrounding consumer behavior (Van Wave & Decker, 2003).

When grocery store marketing data are used to assess dietary quality, it is important to recognize that those who use cards may differ from those who do not, which raises questions about the generalizability of the results. However, store marketing data sufficiently approximates national sales patterns, suggesting that bias may be small and that they have value as a surveillance instrument (Van Wave & Decker, 2003). Another challenge is that marketing data rely on a product's UPC, which is not found on perishable products in the produce, meat, and deli departments so codes for these items are unique to each store (USDA). If data from multiple stores are obtained, data cleaning is required. One study purposefully limited their products to the dairy section instead of fresh fruits and vegetables because the former all had UPC's (Van Wave & Decker, 2003). In general, though, UPC's provide an easy way to compare packaged items across stores and supermarket chains.

The methods for analyzing the data are complex and require trained personnel to sort through thousands of records. For example, Van Wave & Decker (2003) identified 1,642 dairy products by UPC that were for sale at the partnering grocery store chain. They used data over a thirteen-week span, which included 12,516 loyalty card households. They limited their analysis to those households that spent 60-130% of weekly food expenditure averages for families of the same size as estimated by the National Consumer Expenditure Survey. The selected households (2,161) bought over 195,000 items during the study period and nearly 40,000 corresponded to a dairy product. Purchases were aggregated via the customer's loyalty card number to the household level. The dairy UPC's were then linked with appropriate food codes from a USDA standard reference of food and nutrient composition. Unfortunately, the USDA codes are not the same as the product's UPC, so it was necessary to organize the description in the USDA file alphabetically to loosely organize items and then manually assign product information. The

analysis required the creation of nine supporting relational database tables: attributes of each grocery store, loyalty card customers, loyalty card households, dairy product categories, actual purchase records, dairy product UPC and USDA food code linkages, grocery store item category codes, standard reference code numbers for dairy products, and USDA dairy product descriptions and code numbers (Van Wave & Decker, 2003).

Another limitation of marketing data is that information related to race and ethnicity are not typically collected in the loyalty program's application form, so Van Wave & Decker (2003) used surnames as a proxy of Hispanic ethnicity. The validity of this approach was not tested, but in absence of such demographic data, it may be possible to use a Geographic Information System (GIS) to learn about customers. GIS is a tool that maps features and attributes of places and aids in the management, analysis, and display of spatial knowledge. With such a program, loyalty cardholders' addresses can easily be mapped in relation to census data as an approximation of the demographic of shoppers who frequent the store. The system's flexibility makes it extremely useful to better understand who the customers are, how far they travel, and how a particular store competes with other food providers in the region.

Data obtained from sales records, receipts, and marketing programs are valuable resources for the store and health professionals. Unfortunately, they are presently underutilized. Granting health professionals easier access to these sources will expand our understanding of the contributing dietary factors of the obesity epidemic. However, as shown in the following chapter, retailers can, and should, do more to influence consumer purchases.

4. INFLUENCE DIETARY CHOICES IN THE RETAIL SETTING

Many disciplines have attempted to understand the mechanisms of food choice. Unfortunately, the process remains obscure. Researchers do not agree on the most important mediators but they all recognize that the process is complex. Thus, promoting and sustaining dietary change is difficult. For individually based nutrition programs, long term maintenance of dietary regimens typically varies between 20 to 80 percent with high relapse rates, and weight regain within 3 to 5 years after weight loss treatment (Nestle et al., 1998). Conceptual frameworks have been put forth in an attempt to understand relationships between constructs and mediating factors of food choice (Furst, Connors, Bisogni, Sobal, & Falk, 1996); however, they tend to be too complex to be useful.

Applying the Social Ecological Theory to food choice provides a model to demonstrate how grocery stores can influence food purchases by simultaneously intervening at the individual, household, social, and environmental levels. The development of this model was explained in Chapter 2, and the framework is presented in stages with each subsequent section adding to it. It serves to organize the literature and help guide an evaluation of how well supermarket nutrition interventions are currently designed. A matrix of the effectiveness of different grocery store interventions reviewed in this chapter is also included in Appendix A, which describes the program's setting, relevant food constructs, evaluation design, outcomes, and level of intervention based on the Social Ecological Theory.

4.1 INTERVENTIONS TARGETING INDIVIDUALS

Adults typically make the decisions about what they eat, when, and where, so it is reasonable to develop interventions that target the personal attributes that influence these

choices. As shown in the Figure 3, five constructs have been identified that influence food choices: 1) Nutritional knowledge, 2) Attitudes about food and healthy eating, 3) Taste preferences, 4) Self-efficacy, and 5) Perceived susceptibility. Each can influence a person's intention to buy certain products, which is thought to serve as a good predictor of actual food purchases. The factors are described in the context of interventions implemented in the retail grocery setting thus far.

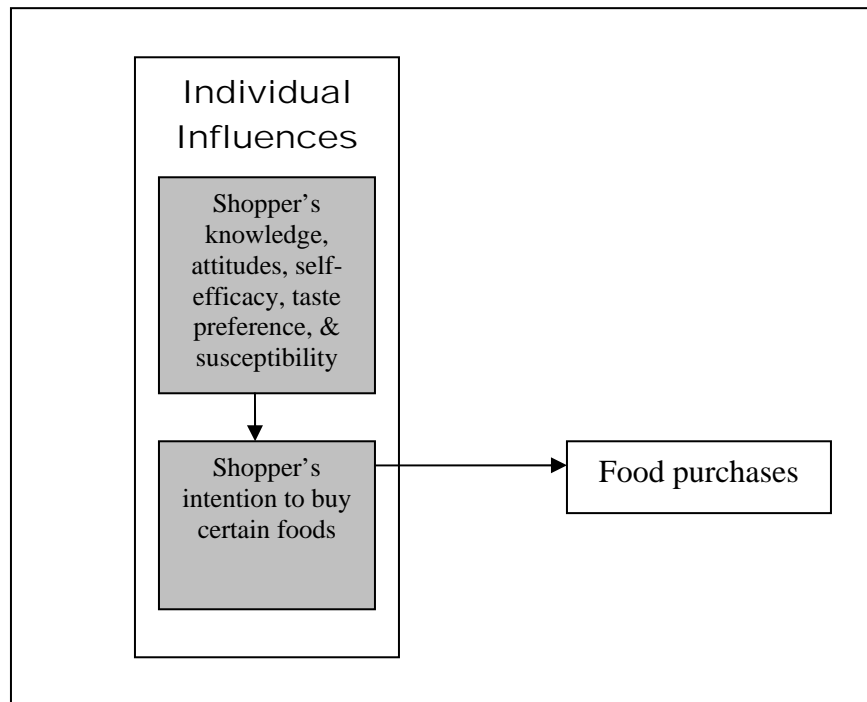


Figure 3. Individual Level Influences of Food Purchases

In general, the level of nutrition knowledge today is relatively high (Blaylock, Smallwood, Kassel, variyam, & Aldrich, 1999; Nestle et al., 1998) and can take the form of knowledge of diet-disease linkages. Data suggests that Caucasians, those who have more education, and those with higher incomes tend to be more aware of diet-disease relationships. Better awareness of cholesterol (Haralson et al., 1990) and fat (Variyam, 1999) related health problems are associated with significant reductions in the intakes of foods containing these nutrients. Further, one study (Haralson et al., 1990) revealed potential racial differences in the association between nutritional knowledge and food choice. Here, knowledge of cardiovascular risks was negatively associated with purchasing saturated fats for white individuals only. Knowing which types of foods and how much to eat based upon USDA's food pyramid may also be important. Of the factors studied to influence fruit and vegetable consumption, the number of

servings that a person thought should be consumed in a day was one of the most predictive (Stables et al., No Year Given). However, a study found no significant correlation between knowledge about food servings and weight status, meaning healthy weight and overweight people were equally able to identify the correct number of recommended food servings. These results indicate that questions about serving recommendations may be poor measures of an individual's actual knowledge about health and nutrition (Mancino et al., 2004), or that there are other more important mediating factors of diet quality.

Another personal attribute highlighted in the nutrition literature and incorporated into grocery store interventions are attitudes toward foods. Nutritional attitudes may either be positive or negative when choosing certain food items. For example, a positive view is the belief that a positively valued outcome (weight loss) is *more* likely to occur or that a negatively valued outcome (weight gain) is *less* likely to occur. Conversely, a negative attitude is typically holding a strong belief that the behavior will *not* result in a positively valued outcome (Montano & Kasprzyk, 2002). The characteristics of a person with positive attitudes toward more healthy foods are not the same as a person with better knowledge of diet-disease relationships. For example, gender, age, and vegetarian status have significant influence on attitudes toward avoiding fat, saturated fat, or cholesterol, but these variables have no effect on an individual's diet-disease awareness, at least for fat and saturated fat (Variyam, 1999).

People do not just think of food items in positive or negative terms; it is also possible to have feelings of ambivalence, which may be especially true since foods are often characterized as both tasting good and being unhealthy (Bradbard, Michaels, Fleming, & Campbell, 1997). In one study, individuals who were more ambivalent about consumption of foods tended to have an unclear relationship between attitude and intention (Shepherd, 1999). Ambivalence about food purchases may make attempts to change behavior through changing beliefs and attitudes more difficult and also labeling foods as "healthy" may stigmatize them as less tasty (Seymour, Yaroch, Serdula, Blanck, & Khan, 2004).

Interventions in grocery stores typically involve health education materials that influence knowledge and attitudes as a central part of their strategy for behavior change. Chain stores (particularly national or regional chains) seem to be more likely to offer such health promotion items than smaller, independent stores (Cheadle et al., 1990). It is thought that interventions that build shopper's expectations that nutritious foods will be satisfying may be effective in changing

food purchases and intake (Anderson et al., 2000). While this strategy can influence knowledge and attitudes, changes in consumer purchasing behavior are more difficult to achieve (Cotugna & Vickery, 1992; Mayer, Dubbert, & Elder, 1989).

One of the biggest challenges is that few people actually acknowledge and use educational materials. For example, studies found the percentage of supermarket customers who passed a printed nutrition display and actually looked at it to be as low 2.4 percent (Cotugna & Vickery, 1992). While, Arcabal et al found about 6 percent recalled signs and only 4 percent read them (Kristal et al., 1997). At the higher end, the intervention effect (intervention minus control) were almost 18 percent for recalling a store flyer (Kristal et al., 1997), twenty nine percent were aware of a shelf labeling program in a low-income area (Lang, Mercer, Tran, & Mosca, 2000), and twenty-six percent stopped to look at a video in the produce aisle, but most viewers had to see the 1 minute tape more than once to correctly identify the theme (Cotugna & Vickery, 1992). Even when stores implemented larger campaigns including product labeling, information booths, banners, posters, cookbooks, in addition to brochures, only about a quarter of shoppers noticed the campaign, with more women than men remembering the intervention materials (O'Loughlin, Ledoux, Barnett, & Paradis, 1996; Steenhuis et al., 2004). African Americans were also significantly more likely to remember a shelf-labeling program than whites and educational level was not associated with awareness (Lang et al., 2000).

In addition to low campaign awareness and usage, researchers have identified other factors that may explain the lack of behavior change for grocery store interventions targeting knowledge and attitudes. First, it has been suggested that there is too much reliance on printed materials, so researchers tested the effectiveness of videos and found varying results. Mullis and colleagues (1988) used a videocassettes focusing on a single item of produce, which were located near the item, and played continuously. Sales data found increased produce sales using both a 90 second and revised 60 second clip (Dougherty, Wittsten, & Guarino, 1990). However, when a three-minute videocassette was run intermittently, no differences in sales data were found. Researchers attributed lack of success to the video's longer length, poor placement in store, insufficient amount of repetition for the customer's continuous contact, and a vague message (Dougherty et al., 1990). Besides the communication channel, researchers also believe that intervention materials were overwhelmed by the amount of sales and signage routinely

displayed in the supermarkets leading to both negative behavioral findings and low campaign awareness (Ernst et al., 1986; Kristal et al., 1997; Steenhuis et al., 2004).

Since knowledge and attitudes are an important, but not sufficient predictor of a healthy diet, grocery stores have incorporated components focused on other elements of food choice shown in Figure 2. For example, taste preferences are important since better liked foods are typically consumed in higher quantities than lesser liked foods, especially among children (Nestle et al., 1998) and obese persons (Mancino et al., 2004; Ransley et al., 2003). Taste is also found to be an important predictor of fruit and vegetable consumption (Stables et al., No Year Given). As humans, we have innate, biologically-based preferences for sweet and slightly salty substances and an aversion to sour and bitter ones. These preferences are based on physiological needs, while instinctual aversions may serve as a protective mechanism from poisons (McIntosh, 1995). In contrast, preferences for high fat foods may be shaped more by experiences in early life rather than by biology (Nestle et al., 1998). Thus, grocery store interventions have incorporated taste testings (Mullis & Pirie, 1988) and food demonstrations (Kristal et al., 1997) into their overall program design.

A recent review of environmental interventions at grocery stores, universities, worksites, and restaurants concluded that taste was not emphasized in the selected interventions (Seymour et al., 2004), but several studies outside Seymour et al.'s criteria used such a strategy (Cotugna & Vickery, 1992; Mullis & Pirie, 1988; Paine-Andrews, Francisco, Fawcett, Johnston, & Coen, 1996). Grocery stores that have used this approach have found differences in sales (Paine-Andrews et al., 1996), but the effects that taste testings have on food purchases can not be isolated since these strategies were evaluated with other components. The impact of taste testing may be influenced by frequency--about 7% of intercepted customers reported taste testing at supermarkets who offered a 3 hour demonstration once a month (O'Loughlin et al., 1996)--and by product selection--customers were much more likely to taste frozen yogurt over low fat salad dressing, and low-fat milk (Paine-Andrews et al., 1996). Based on observational data, customers who sample lower-fat products tend to like the taste so providing the opportunity to sample unfamiliar products may be critical to encourage healthier purchases (Paine-Andrews et al., 1996).

In addition to taste testings, grocery store interventions also incorporated recipes, shelf labels, and/or cooking demonstrations (Cotugna & Vickery, 1992) because they may help to

improve a person's self-efficacy. As related to nutrition, self-efficacy is a person's confidence in their ability to consistently find, prepare, serve, and eat healthier foods. Studies suggest that those with higher self-efficacy in choosing and buying healthier foods are more likely to do so (Anderson, Winett, Wojcik, Winett, & Bowden, 2001). Lack of skills is also commonly cited as a barrier to eating and buying a quality diet. For example, food stamp participants expressed frustrations with their abilities to read label information and translate their knowledge of dietary recommendations into specific food choices (Bradbard et al., 1997).

Shelf labels are a common strategy used by grocery store interventions to help shoppers identify healthier options. They can be helpful since consumers want nutritional information, but many neither comprehend nor use the product labels regulated by the USDA (Glanz et al., 1995; McArthur, Chamberlain, & Howard, 2001). Additionally, product health claims, which are either stated in the form of nutritional advantages (low fat, low cholesterol) or health status (lowers cholesterol or prevents cancer) can highly influence purchases (Nestle, 2002). One of the best-known examples involves Kellogg's cereal packages. After they included statements about the cancer-preventing benefits of high-fiber diets, consumer purchases of its high-fiber cereals increased by 47% within the first 24 weeks of the campaign. Many manufacturers already incorporate health messages into their package design. In a survey of retail products, thirty-four percent of products sold used a nutrient content claim related to energy, total fat, saturated fat, cholesterol, sodium, dietary fiber, or sugars. Interestingly, trends reveal that fewer companies were including such claims since the previous survey, especially for fat, but it was not clear why (Strychar et al., 1993).

Shelf labeling interventions have demonstrated positive results based on customer reports and sales data. The Pawtucket Four Heart Program was an on-going intervention that reported results for a four-year period. At the end of the fourth year, more people were aware of the program, could correctly identify the label, and were more encouraged to purchase labeled items than they were at the program's start (Hunt et al., 1990). Another intervention implemented at a store serving primarily a minority population, included a total of 3,763 shelf labels that identified items low in total fat, saturated fat, cholesterol, and sodium. In addition to the labels, the stores offered promotional materials about the program. Of those aware of the program, fifty-six percent reported use of the labels (Lang et al., 2000).

These studies indicate that people use the programs, but studies that use sales data for evaluative purposes are better able to demonstrate behavioral change. In the Special Diet Alert study, a total of 4,300 brand name products were labeled as a supplement to health education efforts. Over a two year period, the intervention stores found that the market share of shelf labeled products as measured by food sales data increased from 4-8 percent more than control stores (Lang et al., 2000) suggesting that the program influenced purchases. Additionally, as part of the 5 A Day partnership, the Produce for Better Health Foundation created signs, brochures, and point of sale cards located on items in the produce department. Produce sales from 24 stores during a 12 week test period were compared with sales from 8 weeks of baseline, and then compared with 8 control stores. Intervention stores had almost a 9% increase in sales over the control stores produce departments for the entire period (Glanz & Yaroch, 2004).

Health literature questions how label contents relate to program success. The inclusion of brand specific information is a cited method for better results. While Levy et al, and Ernest et al used a similar methodology but only the former found a difference in sales for the labeled products. Investigators attributed the success to an emphasis on brand specific shelf labeling and the duration of the intervention (Mayer et al., 1989). However, an intervention lasting only 7 months provided brand specific information within six product categories but found no difference in behavior. It is not clear whether the lack of effect was due to shorter duration or the tone of the labels (Mayer et al., 1989). It has also been suggested that labels should focus on avoidance of negative nutrients (fat and sugar) instead of increasing consumption of positive nutrients (Mayer et al., 1989). To test this hypothesis, an intervention focused on one product category: cereal and one negative nutrient: sugar and used brand specific information, a nutrient avoidant rationale, and a relatively prescriptive tone in the posters adjacent to the cereal aisle. Results demonstrated increased purchases of low sugar cereals and decreased purchase of high sugar cereals. After the posters were removed these effects disappeared (Mayer et al., 1989). While not all shelf labeling campaigns are effective, some do exhibit positive results.

Shelf labels may help shoppers choose healthier options while in the store, but customers also need confidence in their ability to prepare these items as a meal. Grocery store interventions attempt to build these skills by providing recipes that use healthier options as main ingredients. The effectiveness of providing recipes as a strategy to influence food purchases is not clear. One of the barriers may be utilization since studies tracking recipe usage show that between seven

(O'Loughlin et al., 1996) and eighteen percent (Kristal et al., 1997) of customers surveyed used one. Additionally, a Five a Day recipe book administered to mothers enrolled in WIC (Women, Infants, and Children) showed inconclusive results. Many WIC women felt more confident in their ability to choose quality produce, store fruits and vegetables, and include fruits and vegetables in their family's meals after receiving the booklet. Mothers also reported serving more fruits and vegetables to their families, but surprisingly, the mothers' personal intake of fruits and vegetables decreased slightly over the intervention period (Birmingham, Armstrong Schultz, & Edlefsen, 2004). Another study incorporated several aspects of self-efficacy--recipe cards, a self-help manual, and shelf labels that indicated low-fat choices—which supplemented educational and promotional materials. Even though self-efficacy has been demonstrated to be an important factor in food choice, the intervention did not appear to change fat consumption among intervention stores as measured by self report data (Steenhuis et al., 2004).

Perceived susceptibility is another individual level factor thought to influence a shopper's intention to buy certain foods. In general, people view their intake of particular nutrients as better than others and consistently rate their personal risk of dietary hazards as below average (Shepherd, 1999). This underestimation has been referred to as 'optimistic bias.' If people feel that their diet is already healthy and they are at less risk than the average person, then they will be less likely to implement dietary change. The reasons for optimistic bias are not clear but it has been argued that individuals need to feel that they have control over a situation (Shepherd, 1999). Unfortunately, grocery stores have not incorporated perceived susceptibility into the intervention design and more research is needed to determine the extent this construct influences dietary choices in the retail setting.

Even though results vary in effectiveness for health promotion materials targeted towards individuals, they are typically perceived by shoppers as beneficial (Steenhuis et al., 2004). This perception may make them more likely to shop at stores who offer an intervention (Cotugna & Vickery, 1992). However, interventions must do more than simply provide educational materials and labels targeted to shoppers, because as shown, shopper's intentions to buy certain items are also directly and indirectly influenced by household and social factors.

4.2 INTERVENTIONS TARGETING HOUSEHOLD FACTORS

When people shop at the grocery store, they are often buying items for an entire household, which may consist of only themselves or many individuals of different ages and sexes. As shown in Figure 4, several household factors influence the primary shopper's intention to buy certain foods including family members' preferences, household income, and time available for food preparation. The dotted line between income and time availability means that there may be an association between the two boxes, but it is speculative at this point in time.

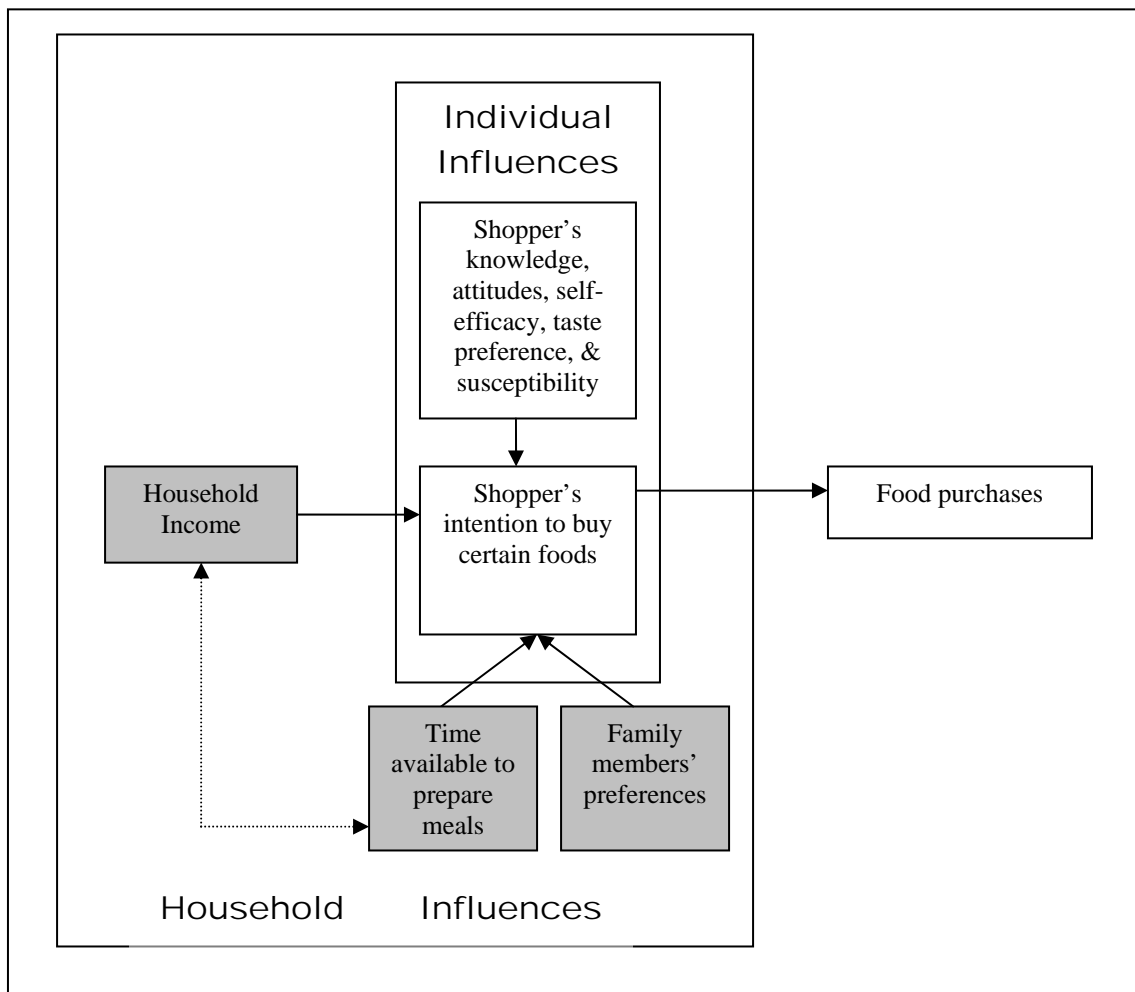


Figure 4. Household Influences of Food Purchases

Intra-family interactions can influence food choice and consumption in multiple ways. For example, preferences of the primary shopper can influence consumption of foods for other family members. Problematically, the effect of taste preferences is typically exaggerated in obese subjects and it is likely that patterns of eating which have been involved in the causes of obesity in a primary shopper may influence the diet of other members of the family, especially children (Ransley et al., 2001). Additionally, there is evidence that preferences of family members influence the primary shopper's food purchases. Female food stamp respondents said their own taste and product preferences had less influence on food choice than those of other family members. The women also reported that any attempt to change product choices for the better brought resistance from members of the family (Bradbard et al., 1997).

Studies (Henry et al., 2003) have also shown that child-prompted purchases can make up about 14 percent of a household's food dollar. Shoppers rationalize that it does not make sense to buy foods that children will not eat. Further, low-income shoppers were even willing to buy more expensive brands if children requested them (Bradbard et al., 1997). However, there is a wide range in the proportion of food dollar spent on child prompted purchases which would suggest that this influence is stronger in some families than in others (DeWalt et al., 1990). The significance of child prompted purchases is that more than half of these items were calorie dense. Thus, it may be necessary to address family members' concerns when trying to influence the primary shopper's intention to buy certain items. Currently, no grocery store interventions in the literature focused on these household influences. Strategies tailored to family members' attitudes towards healthier foods may be more likely to succeed.

Household income is also an important influence on intention and food purchases. Most US households realized a modest decline in price adjusted food expenditures, for both at home and away from home food during the 1990's (Blisard & Harris, 2001). In 1999, spending was estimated to be an average of \$5.50 per person per day on food (Reed et al., 2004). In white households, per person total food spending is found to be higher than in black households. Single, female-headed households with children spend less per person on food than the poorest US households. Additionally, poorer households spend a larger share of their incomes on food than do wealthier households, which demonstrates a well-known rule in economics that asserts the budget share of necessities declines as income increases (Blisard & Harris, 2001). To investigate how expenditure patterns differ between high and low-income markets, a developed

index compares sales of grocery items in these contrasting markets to national averages. Grocery categories that are relatively important in high-income areas like juices, bottled water, and frozen green beans tend to be relatively unimportant in low-income markets and vice versa. This data support the hypothesis that that grocery store purchases in high-income markets are less calorie dense (Jekanowski & Binkley, 2000). Thus, income limitations ultimately affect the types and amounts of food items that can be purchased and creates barriers to a healthier diet for minority, lower-income, and single, female-headed households.

Federally funded programs such as the Food Stamp Program and Women, Infants, and Children (WIC) aim to reduce these economic barriers, reduce hunger, and improve nutrition for low-income persons. However, enrollment rates suggest that more families could be helped by these programs. Nationally, about 38 percent of eligible households do not apply for food stamps (Culp & Cassady, 2005). The main barriers explaining why eligible people do not apply include unawareness of program or misperception that they don't qualify, transportation barriers, limited office hours, poor customer service, and the belief that the amount of benefits are not worth the hassle of applying (Culp & Cassady, 2005). Researchers (Culp & Cassady, 2005) at the University of California, Davis conducted food stamp outreach in grocery stores as a way to reach many working families. This type of intervention simultaneously provides nutrition education in the store and thus addresses household income barriers as well as individual level factors. Additionally, if more eligible consumers used food stamps, grocery stores may increase sales as a result. Unfortunately, the evaluation of the program was primarily process based so it cannot be determined how this intervention influenced the amount of households spent on food, improved dietary choices, or improved state enrollment rates for programs. Researchers developed a guide based upon their experiences, which could be used to replicate the study for further research.

Shoppers with limited incomes also use a variety of economizing tactics to stretch their food dollar. Using 1998 food store purchase data, low-income households (less than 25,000/year) spent a greater share of expenditures and bought higher quantities of cheese, fruit, vegetables, and meat products on promotion than other households. Low-income shoppers also tend to economize by purchasing private label products (Bradbard et al., 1997; Leibtag & Kaufman, 2003) and shopping at places that offer double coupons (Leibtag & Kaufman, 2003). Low-income households purchase more meat than other household types but spend less per

pound for both meat and poultry (Leibtag & Kaufman, 2003) suggesting that they may be purchasing lesser quality cuts. Additionally, focus group data suggest that they tend to buy more meat and store it for the cost savings (Bradbard et al., 1997). In general, buying and eating better meals at a price that a family can afford requires a consideration of specials that local markets offer and knowledge of what foods are plentiful in the market (Kroog, 1975). Unfortunately, meal planning as a household economizing strategy dropped nine percentage points to 19 percent in 2002 (FMI, 2005).

One explanation for this reduction in meal planning is the important role that convenience has come to play in food choice. A fast paced lifestyle has been cited as a barrier to healthy eating (Eikenberry & Smith, 2004; Kraak, Pelletier, & Dollahite, 2002) and several sources associate time constraints with household composition. Survey results from the Food Marketing Institute reveals that larger households and those who have pre-teen children are more likely to be concerned with convenience (FMI, 2005). Additionally, compared with single parents, married parents have a higher quality diet, eat breakfast more often, and drink fewer sugary beverages (Mancino et al., 2004). Sales of frozen food and convenience items were also correlated to female labor force participation in markets throughout the country; researchers concluded that increasing market participation by household members, and rising incomes, have contributed to differences in regional and national patterns of food purchasing (Jekanowski & Binkley, 2000).

Unfortunately, convenience foods like pre-packaged meals typically contain more sodium and fat and are usually more expensive than other items that have greater nutritional value and require only slightly more preparation time. Despite these drawbacks, they are perceived to be advantageous especially among working people because of the ease of preparation and taste appeal to family members. This perception also exists among low-income households despite their limited food dollars and their recognition that convenience foods are more expensive (Bradbard et al., 1997). While manufacturers are responding to these concerns with products like pre-washed, packaged salads, no grocery store interventions in the literature mention convenience as a guiding principle in their program design. This is an important area of food choice that warrants additional research.

4.3 INTERVENTIONS TARGETING THE SOCIAL ENVIRONMENT

As related to food purchases, the social environment consists of cultural traditions and advertising that influence the shopper's and family member's nutritional knowledge, attitudes, self-efficacy, taste preferences, and perceived susceptibility as well as the time available to prepare meals. As shown in Figure 5, family income is not influenced by cultural traditions or advertising so it falls outside of the shaded box.

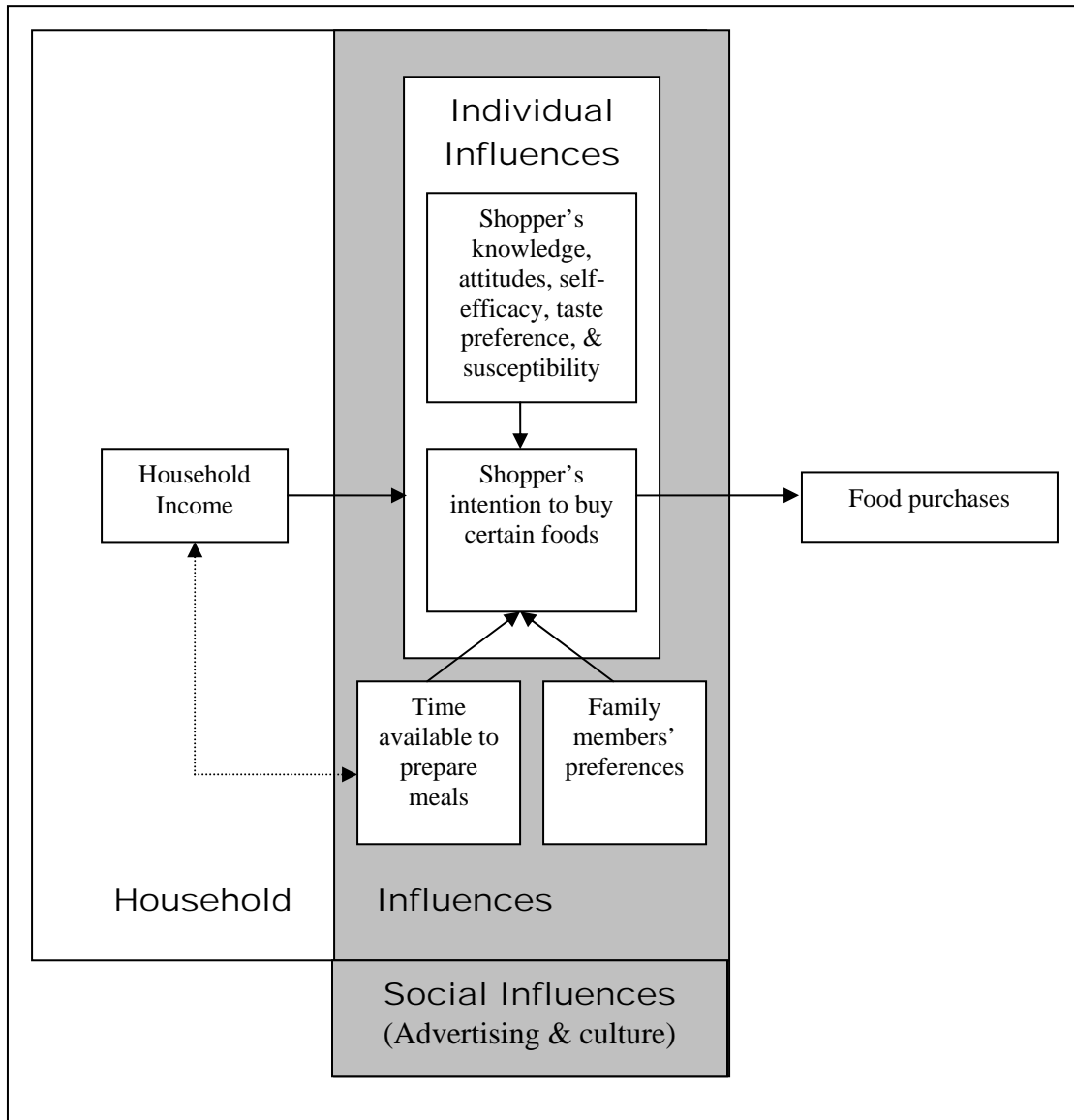


Figure 5. Social Influences of Food Purchases

In addition to individual influences like taste and food choice, preferences also result from cultural traditions (McIntosh, 1995). If it were not for repetition or socialization, few

people would consume foods like coffee, beer, or other foods considered an ‘acquired taste’ because they are bitter on first tasting (Germov & Williams, 1999). Since food typically can build and maintain social relationships in all cultures, strong sentiment becomes attached to favorite dishes and foods traditionally served at celebrations (Germov & Williams, 1999). African American and Hispanic food stamp recipients reported that they learned how to shop and cook from their mothers and continue to buy and prepare culturally familiar foods. Their cooking skills related to traditional dishes are a source of great pride for them. They also remarked that family members enjoy traditional meals and often react negatively when new foods or cooking methods are introduced to the household. Food stamp recipients in all ethnic groups, but particularly among African Americans, emphasized the importance of serving meat as a part of dinner (Bradbard et al., 1997).

It is well accepted that culture is a pervasive foundation that underlies food choices. Consequently, health professionals stress tailoring nutrition education programs so they are culturally appropriate (Germov & Williams, 1999). Unfortunately, grocery store interventions in the literature did not mention the importance of cultural tailoring and as a result provided no methodology as to how this tailoring process could take place in the retail setting. One way to ensure cultural appropriateness is to work closely with the customer base when addressing the complex, social influences on food choice, as discussed in Chapter 5.

Various marketing and social factors are also thought to influence the attitudes and beliefs of the individual and household members affecting their intentions to buy certain items (Shepherd, 1999). Food advertising plays a major role in food purchases and consumption. The U.S. food system is the economy’s largest advertiser with annual spending totaling more than \$11 billion on media spots in magazines, newspapers, radio, television, and billboards. Unfortunately, most advertising is paid for by companies that produce sweet, high-fat, and highly processed products. Nearly 70 percent of food advertising is for convenience foods, candy and snacks, alcoholic beverages, soft drinks and desserts, whereas just 2 percent is for fruits, vegetables, grains, or beans. Despite arguments by marketers that advertising is a minor element in food choice and that its pervasiveness dilutes its impact, they continue to spend millions to market their products (Nestle, 2002). It is difficult to counter this argument with a direct relationship between advertising and sales because these data figures often constitute proprietary information. However, food sales increase with the intensity, repetition, and visibility of the

advertising message. Advertising also has considerable impact on children. It has been shown to not only advance their demands to primary shoppers, but also to increase their knowledge of brand names, cause them to develop more positive attitudes toward heavily advertised snack foods, and encourage sales from children with discretionary money (Nestle et al., 1998).

Several mass media campaigns have been conducted to influence purchases in the retail setting. The messages of the 1% or Less Campaign focused on the benefits of low fat milk by showing the fat content in whole milk versus low fat milk. They were simple and strongly worded paid advertisements on TV and radio. After the six week media campaign, results found that thirty-four percent of high fat milk drinkers reported switching to low fat milk. Additionally, low fat milk sales increased from 29 percent of overall milk sales to 46 percent, an effect that was sustained for at least 6 months after the intervention ended. (Reger, Wootan, & Booth-Butterfield, 1999). Secondly, the National Cancer Institute's National 5 A Day partnership grew out of the public/private partnership that emerged from California's campaign, which included mass media, print materials, and supporting retail partners to reinforce messages. By campaign's end, 15 California supermarket chains representing 1,800 stores had signed license agreements (Foerster et al., 1995). Between 1989 and 1991, fruit and vegetable consumption rose by 0.3 servings for both Caucasian and African American adults in California, a rate four times higher than for secular trends. Although the pilot campaign did not use an experimental design and thus can not prove that this increase can be attributed to the intervention, the results are encouraging (Heimendinger, Stables, & Foerster, No date given). Evaluation of other state mass media efforts suggest that the messages can increase nutritional awareness and boost produce sales (Pivonka, Foerster, DiSogra, & Massimilla, No date given).

Unfortunately, these campaigns are too expensive for grocery stores to implement themselves. For example, the implementation of the 1% or Less Campaign cost \$43,000 (Reger, Wootan, & Booth-Butterfield, 2000), and California's pilot mass media campaign was estimated to be worth over \$400,000 dollars. However, grocery stores also promoted the 5 A Day for Better Health messages using smaller scale techniques. Due to proprietary issues, exact expenses are not known, but one executive approximated that at that time of implementation, the store costs to run weekly full-page, color ads and recipes, in-store signage, and consumer brochures were about \$1000 (Foerster et al., 1995). If larger social marketing strategies are used, it may be necessary, though, to involve national health organizations to offset some of the costs.

4.4 INTERVENTIONS TARGETING THE BUILT ENVIRONMENT

Figure 6 demonstrates that individual, household, and social factors influence a person's intention to buy certain foods, but environmental factors determine whether this intention can be easily acted upon. For example, a person may have the intention to purchase a certain item, but if he/she cannot get to a store that sells it or if local stores do not stock it or stock it at a price above the household's budget, he/she cannot buy it. Food purchases in the retail grocery setting are made in the context of availability, accessibility, and affordability, and interventions focusing only on intention will likely fail, unless environmental barriers are adequately addressed.

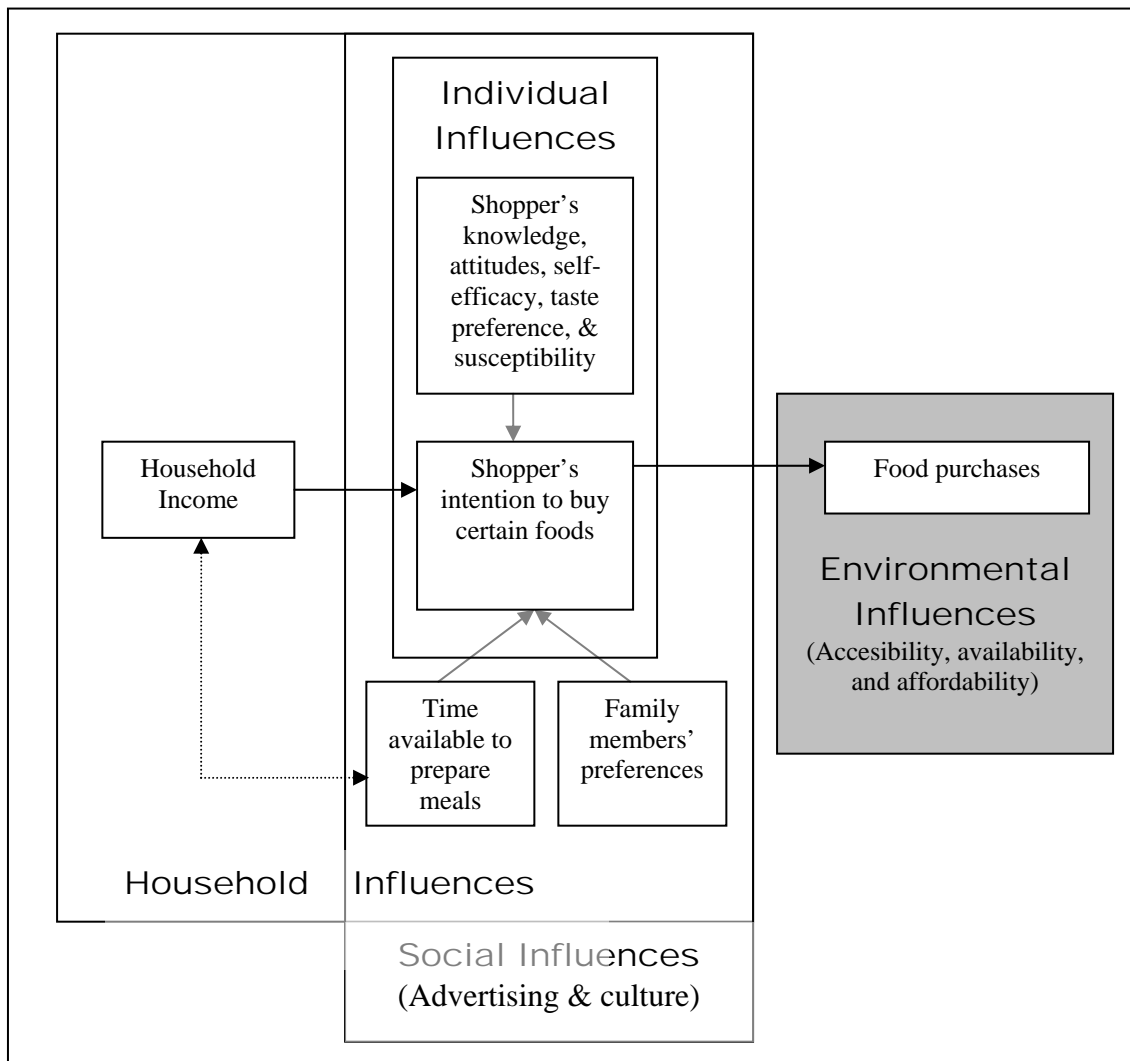


Figure 6. Environmental Influences of Food Purchases

Market basket studies are frequently used to assess the availability and prices of food items. In previous studies, healthy food items are available to low-income consumers if they have access to a grocery store (USDA, 1998). Also, the majority of low-income consumers prefer shopping in supermarkets rather than in specialty stores or farmer's markets (Cassady & Mohan, 2004). However, disparities in access to grocery stores for many inner city neighborhoods have been well documented. Pittsburgh joins a list of US cities where there's evidence of inadequate service from urban supermarkets (USDA, 1998). Cotterill and Franklin (1995) documented that low-income areas in nineteen cities in the United States had 30 percent fewer stores per capita as compared to higher-income areas (Kolodinsky & Canwell, 2000). Other studies found regional disparities in relation to income (Morland, Wing, Diez Roux, & Poole, 2002) and racial composition (Morland et al., 2002; Zenk et al., 2005). There is also evidence suggesting that locality is tied to quality (Zenk et al., 2005) and price (Morland et al., 2002) with urban dwellers paying more pay and reporting lower quality food items.

Research has used location of stores within zip codes, census tracts, Euclidean distance (straight lines), and Manhattan block distance (angular lines) to quantify the access disparity. Without information on shopping habits, though, there is no validation that people actually purchase food within their census tract of residence or within a certain distance. This measurement decision is especially important since research has shown that census tracts are good approximations for neighborhoods, but a study using similar data collection methods but expanding the geographic boundary to zip codes found little access disparity or price differential between the total population and those living below the poverty line (Ohls, Ponza, Moreno, Zambrowski, & Cohen, 1999).

Retail grocers have cited the following explanations for the lack of supermarkets in urban areas (FMI, 1998; Kolodinsky & Canwell, 2000):

- *Economics* (median income, population size and density, shifts in population and transportation patterns)
- *Land* (availability of large parcels and neighborhood characteristics)
- *Industry* (cost of store development and maintenance, fewer chains, multi-service operations with higher sales per store, and market pressure to increase profits and cash flow)
- *Social concerns* (crime, perceived and actual racism)
- *Political concerns* (zoning approval and local politics)

Most of these barriers are justifiable, and grocery stores should not have to be solely responsible for filling the service gap. Local and national policies could be implemented to overcome these barriers and concerns. In the meantime, though, grocery stores are making efforts to improve access for low-income, urban residents. Publications from the Food Marketing Institute and the USDA chronicle a selection of successful new or re-opened urban stores throughout the country (FMI, 1998; USDA, 1998). While the case studies do not specifically evaluate the health impacts on the communities, they do mention both the challenges faced by the stores and the positive results that have arisen from such ventures.

Even with successes, much more needs to be done to improve access to supermarkets especially since lack of access to a convenient grocery store is often exacerbated by low vehicle ownership for many low-income households. In a study of food stamp participants, fewer than half owned their own vehicle and relied on carpooling, walking, or public transportation to do their food shopping. Because of the low percentage of automobile ownership, one fifth had out of pocket costs for transportation (Ohls et al., 1999). Thus, transportation needs add to the cost of grocery shopping for lower income residents, which decreases the income available to buy quality food items (Kolodinsky & Canwell, 2000). Organizations such as Food Marketing Institute, National Academy of Sciences, and the Community Food Security Coalition have documented the success of supermarket sponsored shuttle services to transport customers who do not own a car in low-income areas of New York, Newark, Charleston, Houston, and Los Angeles. Typically, customers found their own way to the store and the shuttle provided a free ride home, sometimes with an added requirement of a minimum purchase amount or restrictions on distance traveled. The programs were supported at the corporate level, but the services were offered only at those stores that served areas with high poverty rates, a high volume of transit dependent households, and those that had high percentage of walk in customers. Reasons for implementing such programs included reducing costs from stolen shopping carts and improving customer service (Cassady & Mohan, 2004).

Due to proprietary concerns, it is not possible to determine whether the programs generated enough revenue to be profitable, but since the shuttle programs were all well established, there was probably some benefit to the store. Costs associated with each of the various programs differed because some were implemented using in store employees and corporately owned vehicles, while others contracted the service to a transportation firm. The

high annual fixed costs may be a barrier for small chains and independent supermarkets, but may be feasible if it can move a large percentage of the transport dependent population. Shuttle services may offer the potential for new revenue from transit-dependent customers. One store estimated that per customer sales increased from \$8 to \$18 after their shuttle began, although other changes were made at this time that could have accounted for the increase as well. Unfortunately, a shuttle's impact on food purchases and shopping behavior is not well documented even though they are a feasible approach to alleviating access barriers (Cassady & Mohan, 2004).

In general, the impact that limited access to healthy foods has on diet quality and health status is not well documented. Though alcohol research suggests that alcoholic beverage consumption increases with an increase in the availability of alcohol, fewer studies have researched whether the availability of recommended foods affects their consumption (Wechsler, Basch, Zybert, Lantigua, & Shea, 1995). Of the studies that attempt to demonstrate an interaction between intake and the environment, results vary and different study designs make comparisons difficult. For example, supermarket fruit and vegetable price, distance to the nearest supermarket, lack of transportation, and potential difficulties with grocery shopping were not significantly associated with either fruit or vegetable consumption (Pearson, Russell, Campbell, & Barker, 2005).

In contrast, other studies have found a relationship between dietary intake with measures of distance to the nearest supermarket and access to supermarkets in the census tract of residence. Individuals living farther than 5 miles from their principle store consumed significantly less fruit than those living within a mile (Rose & Richards, 2004) and pregnant women who lived greater than 4 miles from a supermarket had a significantly lower quality diet than those living closer to one (Laraia, Siega-Riz, Kaufman, & Jones, 2004). The presence of supermarkets--but not small grocery stores--in the census tract of residence was associated with meeting dietary recommendations among African Americans even after controlling for education and income (Morland et al., 2002). In this last study, a dose response pattern was found, meaning those who lived in a census tract with a supermarket were less likely to meet intake than those who lived in a census tract with two supermarkets, corresponding to an average increase of 32 percent for each additional supermarket. Compared with African Americans, estimates of the association between the local food environment and reported intake of recommended foods and

nutrients revealed associations that were weaker among Caucasian Americans. This interaction between race and the local food environment suggests there may be other race specific mechanisms involved (Morland et al., 2002). Affordability may also lead to positive health effects. Children who lived in metropolitan areas where fruits and vegetables were relatively expensive gained significantly more weight than children who lived in cities where they were cheaper even after the children were matched for similar characteristics and standard of living (Strum and Datar, 2005).

Other studies have found a relationship between dietary consumption and the type of store where shopping takes place. Food stamp households that purchased most of their food from supermarkets consumed more fruit than households that shopped from other stores (Rose & Richards, 2004). This difference can possibly be explained since it has been found that smaller, independent grocers (Jetter & Cassady, 2006) and corner bodegas (Blocker & Freudenberg, 2001) serving low-income areas are less likely to carry healthier items because they often do not have the customer volume to stock fresh produce and when they do offer such items, they usually charge higher prices. Although supermarkets tend to provide better access to healthy, affordable options, it is important for smaller retailers to stock shelves with healthy items to reduce this access disparity seen in urban neighborhoods. A sample inventory is available from the University of California, Davis (Davis, 2003), and other studies have documented a community-oriented process for conducting one (Sloane et al., 2003).

It is not clear whether stores that carry lesser relative amounts of healthy items do so because of differences in supply or in demand. Supermarkets often choose items to stock based on factors like profit margin, number of units sold, local demand of customers, the range in competing stores, and size of package available (Steenhuis, Van Assema, & Glanz, 2001). One study demonstrated an association between the relative amount of shelf space occupied by low-fat and high fiber products and community self reported intake of these items. The authors acknowledge that it is unlikely that manipulating the amount of shelf space given to low fat and high fiber products will influence the amount of healthful products sold and consumed. They attributed the association to the grocery store's ability to meet customer's demands, but recognize that the association may suggest that shelf space measures might be candidates for proxy behavioral measures (Cheadle et al., 1993). However, there is limited experimental evidence suggesting that increasing availability and convenience of healthy food items may be

effective strategies in promoting consumption. Adding healthier options, providing bonus space for products, and improving the quality of the foods' locations has been shown to significantly increase sales of hard fruit and cooking vegetables (Glanz & Yaroch, 2004) and may attract a new market to the store (Steenhuis et al., 2001).

While choosing among the options offered at a supermarket, price was reported as the most important consideration in making choices (Bradbard et al., 1997). Many low-income shoppers believe healthy eating costs more (Blaylock et al., 1999; Bradbard et al., 1997; Eikenberry & Smith, 2004). Meats, fruits, and vegetables tend to be the most expensive and thus make up a large share of household expenditures for at home food items (USDOL, 2004). One study examined average national retail prices for fruits and vegetables and found that although prices might appear high on a per pound basis, the cost lowers when serving sizes are considered. Twenty-five fresh fruits studied cost less than \$0.25 per serving. Since fresh and frozen vegetables are typically more expensive per pound than other forms, it is not surprising that the least expensive way of purchasing vegetables is in the canned form. Consumers can meet the USDA's recommendations of three servings of fruits and four servings of vegetables daily for as little as 64 cents and those trying to meet the 5 a day challenge could do so for even less (Reed et al., 2004). Although it is believed that purchasing patterns for fruits and vegetables are not very sensitive to price changes, consumers are more likely to buy more of the lower priced items (McLaughlin, 2004). Among the 154 forms of fruits and vegetables included in the study, 27 percent cost less than the weighted average price per pound, yet they accounted for 60 percent of total sales volume and 41 percent of total expenditures (Reed et al., 2004).

Researchers (Jetter & Cassady, 2006) in California used another approach to measure cost of healthy options. They developed a healthier market basket, which was based on USDA's Thrifty Food Plan (TFP), a meal plan that demonstrates how a diet meeting minimum recommendations may be achieved by a family of four on a modest budget for food stamp recipients. The healthier basket had four times the amount of fiber and one-fifth the grams of total fat than the TFP. No substitutions were made for fresh fruits, vegetables, eggs, beans. The healthier basket was significantly more expensive than the TFP market basket, which can be mostly attributed to higher prices for whole wheat breads and whole grains, low-fat ground meats, and skinless poultry. There appears to be supporting evidence to this higher price perception but it may not apply to all fruits and vegetables.

Product prices are affected by store promotions, coupons, seasonality, economies of scale, brand, and regional or geographic variation (Reed et al., 2004). Research has shown that people are sensitive to the relative price of healthier food items (Paine-Andrews et al., 1996). One study found that price is a significantly stronger influence on healthy food choices compared to labeling healthy foods (Jetter & Cassady, 2006), but researchers have identified a lack of research in terms of how price reductions affect purchase of fresh fruits and vegetables. It has been found that a major retail promotion of fresh produce can increase sales by 75 percent on average, considerably more under certain conditions, but it is not known what proportion of this increase comes from the price reduction and what comes from the additional merchandising activities (McLaughlin, 2004). This evaluation discrepancy is exemplified by an intervention that used informational flyers promoting fruits and vegetables on sale (including fresh, frozen, and canned), and included messages to eat more fruits and vegetables, coupons to save money, and recipes incorporating the sale items. Store labels also highlighted the items listed on the flyer. Almost 36% had used a 50 cent coupon but there were no significant intervention effects on the purchase of fruits and vegetables or recall of signage (Kristal et al., 1997). A recent review of retail nutrition interventions concluded that reduced prices and coupons have good potential, but these strategies may only assist those who would have bought fruits and vegetables even without the interventions (Glanz & Yaroch, 2004).

More research is undeniably necessary to fully understand the interactions between the food environment and a poor diet, especially how availability, accessibility, and affordability of healthy options or lack thereof may influence dietary purchases.

5. PARTNER WITH LOCAL STAKEHOLDERS

Supermarkets, like any retail venture, are most successful when they meet the needs of the community in which they serve. But, how do stores determine whether they are meeting its customers needs? The easiest way is to look at profits; if people are coming to the store and spending money, then one may assume that the store is successful. This economical perspective may be the easiest, but is not the best since it lacks input from the customers. Perhaps, people may have no other choice where to shop and must come to that particular store. Thus, a better strategy in meeting the needs of the community may be to ask them directly and then work closely with customers and other community representatives to ensure the goals of both the store and community are met.

Fortunately, grocery stores acknowledge the importance of a collaborative approach and have instituted innovative partnerships that aim to 1) work with local community organizations to hire and train people from the surrounding neighborhood; 2) support programming of local schools, churches, and food banks; and 3) set up consumer boards (FMI, 1998). These examples demonstrate that health promotion is just one of the many important issues grocery stores can address through partnerships. However, a community-based approach is especially important for dietary change since social science theories can not adequately explain the process of food choice (Lytle, 2005). Additionally, identifying the relevant factors at the individual, household, social, and environmental levels that influence food purchases will no doubt vary based on a community's history and its current assets and needs.

Community-based approaches to health promotion have become increasingly popular and are believed to foster an effective strategy for addressing many health problems, including cardiovascular disease, cancer, and obesity. They offer benefits over traditional individual programs because they can reach broad audiences, change overall community attitudes about health problems, which may be a prerequisite for sustaining individual level improvements in health behavior (Cheadle et al., 1995), and empower members to take control over their own

lives and environment (NIH, No date given). Members in this case include both grocery store and community stakeholders. Other concepts related to a community-based approach focus on a participation, critical consciousness, and community capacity (NCI, No date given). Capacities relate to 1) Accessing external information and resources relating to nutrition and health; 2) Developing questions and drawing their own conclusions about program options; 3) Making sound collective decisions of the intervention components; and 4) Evaluating and changing the program as needed. The rationale of the participatory process is simply that consumers are the experts in why they buy certain products and their inclusion gives them the opportunity to decide what is most relevant in their lives (Buchanan, 2004; Vaandrager & Koelen, 1997). Additionally, grocery store employees have a great deal of experience, knowledge, and resources to offer that can help plan and implement successful nutrition interventions in the retail setting.

Even though the approach is becoming more popular as a strategy for health promotion, it does require an ideological shift from the traditional notions of science and research. The traditional model assumes that behavioral scientists generate knowledge relating to nutrition and food choice and nutrition educators implement and transfer the knowledge to consumers. This model has been criticized mainly because it does not consider consumers as participants but as passive receivers of expertise from the outside (Buchanan, 2004). Most of the nutrition education programs implemented in the grocery store setting thus far used this traditional approach as revealed by the fact that few of the articles explicitly mentioned any role of grocery store management, personnel, or customers in the planning stages. It is likely that researchers developed the program, found a store willing to participate, implemented the components, and then conducted an evaluation.

With a little effort, though, retail grocers could implement a community-based program that has the dual goal of health promotion and increasing store profit. First and foremost, it is essential to collaborate with community members and identify what they want and need. Will losing weight help residents achieve the goals they have set for themselves? Health professionals can tell people why maintaining a BMI of 25 is important, but they should decide for themselves whether it is a worthwhile to invest grocery store or other community resources into such efforts (Buchanan, 2004). If nutrition is not a goal, the store could focus on other salient community concerns like unemployment or youth programming. Once a decision has been made that a community wants to do something about healthy eating, they can choose among the most current

and relevant behavioral change strategies. Relying on existing literature will save time and resources as well as learn from other program's successes and failures (Lytle, 2005). Programs can be tailored to local needs, which successfully can lead to a diverse array of program components (Samuels, 1993).

The initiator of the health promotion efforts is less important than the involvement of retail grocers in the process. Most large scale community-based projects have been initiated by nutrition educators with the permission of store managers; others were started by corporate nutritionists or consumer representatives employed by grocery stores or chains (Weimer, 1999). Although, grocery stores form consumer panels as an outreach strategy, there is no nationwide assessment of how commonly they are found within the retail sector. On the contrary, there is some evidence that store managers do not welcome outside input. A survey of Californian based supermarkets revealed that 76 percent of store managers indicated that they did not desire help with their health promotion materials from health professionals or agencies (Elder, Sallis, Mayer, Hammond, & Peplinski, 1989). Retailers also felt that their role is to sell and not promote healthy items (O'Loughlin, Renaud, Richard, Gomez, & Paradis, 1998). Therefore, the first barrier to overcome is convincing store managers the benefits of a community-based partnership in order to move the store from the periphery to a central component of the community's health. National or local health agencies can aid in this lobbying effort and once on board, stores can take a pro-active role in organizing and supporting the community partnership.

The National Cancer Institute and Giant Foods in the Washington DC area documented a collaborative process that could be adapted for local use. The partnership instituted several mechanisms at the outset to ensure joint development and cooperation. First, a memorandum of understanding was signed that outlined the project, detailed the roles and responsibilities of the two sponsoring organizations, and outlined mutual understanding about program content, data collection, and distribution of program materials. Second, a formal working group was established. In this case, members consisted of NCI and Giant staff, a technical consultant, and writer-editor, but members should be specific to the grocery store and local community (Light et al., 1989). Since grocery stores serve diverse communities with specific religious and cultural affiliations, economic and political structures, educational systems, and voluntary groups, it is important to identify appropriate stakeholders who have something to offer and gain from a community-store partnership. With such a complex phenomenon as dietary behavior and food

choice, successful efforts will most likely occur through an inter-sectoral approach that involves multiple parties (Vaandrager & Koelen, 1997). Relevant members of the committee may include customers; representatives from local community groups, health departments, state health organizations like the American Heart Association (Glanz et al., 1995), local universities, hospitals or other health care providers; social workers; representatives from nearby schools; and staff from local WIC or Food Stamp offices. The function of this working group would be to make decisions about how to improve food choice among residents in the retail setting and develop program and evaluation materials. The NCI and Giant Foods partnership also created three advisory panels to aid in the planning which included representatives from governmental agencies, academia, food industry, and consumer groups (Light et al., 1989).

Retail grocers have to recognize the common ground between their store and the health of the community. Without a community-based approach, grocery stores can easily make the mistake of pulling together nutrition interventions that are not appropriate for the social and environmental context or possibly not wanted by community members. Working together is a worthwhile proposition to enhance the store's importance in the community but an increasingly needed process as we address the nation's obesity epidemic.

6. DISCUSSION

Obesity is a national health crisis, which demands immediate action from multiple stakeholders. As public health interventions are developed to address this epidemic, this project presents how retail grocers can improve the dietary health status for Americans. Three primary roles have been discussed: Contribute to nutritional assessments, influence dietary choices in the retail setting, and partner with local stakeholders. These last few pages offer a summary and concluding remarks related to future research and next steps.

Even though some grocery stores have released their data for research, in general, proprietary restrictions have prevented researchers and policy makers from fully accessing these valuable data. It is important to create a system where this information is more freely shared, but it will first be necessary to convince retail management of the benefits of releasing their data. Lessons can be learned from other national surveillance systems like the National RODS Open Source Project, which is a program used by health departments to monitor clinical data and sales data of over the counter medications as a surveillance tool of disease outbreaks. Retailers such as pharmacies and drug stores are participating in this project (UPitt, 2003). A similar program could be developed that tracked certain grocery items that have been identified as markers for diet quality. More research would be needed to decide on appropriate markers, but RODS demonstrates that involving the retail sector in health-related initiatives is not only possible but can be extremely useful. Better surveillance is an important contribution to epidemiological research; however, it is only a preliminary step toward improved national nutrition. Retail grocers also need to be proactive in developing cost effective interventions focusing on better food purchases and the prevention of obesity.

There is room for improvement in the nutritional interventions conducted in the retail grocery setting. As shown in the summary table of Appendix A, results are mixed but encouraging nonetheless. Unfortunately, many of the nutrition interventions were conducted during the 1980's and 1990's and more recent retail interventions need to be conducted.

Additionally, even though retail interventions have been implemented in inner city, middle class, and affluent communities, and were found to be viable in low-income communities as well (Glanz & Yaroch, 2004; O'Loughlin et al., 1996), researchers need to develop appropriate interventions for different populations. A focus should be placed on tailoring to high-risk groups in an attempt to eliminate the disparities seen for obesity based on age, race, sex, and income.

Sustainability should also be considered when designing interventions because program duration may have a direct impact on outcomes. In a published review, the three studies that showed the greatest impact lasted for 2 years (Seymour et al., 2004). Large multi-component interventions are difficult to continue without appropriate planning and community participation. Even though retail grocers already use strategies that attempt to influence purchases, they still face barriers sustaining in store health efforts (O'Loughlin et al., 1996). Lessons learned from other health promotion programs should be applied to the retail setting. For example, it has been found that interventions with a program champion, had no paid staff, and underwent modification during implementation were much more likely to remain viable than those that required paid staff, did not have a local advocate, or strictly adhered to the original design (O'Loughlin et al., 1998). Others have suggested that substantial participation in program development and implementation by key individuals such as community leaders produces higher levels of perceived program ownership and increased probability of program continuation by communities (O'Loughlin et al., 1998). Thus, it is not only important to develop appropriate strategies for high-risk communities, but also ensure their sustained continuation for the greatest improvement in diet related health outcomes.

Likewise, interventions in the grocery sector must be rigorously evaluated and the results disseminated if we are to learn better practices and avoid common mistakes. In a survey of community-based health promotion programs, it was concluded that while many organizations like churches, worksites, and supermarkets offer related programs to many people, their quality and effectiveness are unknown (Elder et al., 1989). Evaluations should use a controlled, experimental approach but lack of time and resources may unfortunately dictate lesser quality designs. Additionally, some of the studies relied primarily on self-report data and stores should also utilize their valuable data sources as well. Dissemination of effective strategies should not be limited to peer reviewed journals; channels that are more accessible to grocery store personnel and other non-academic stakeholders should also be pursued.

Another area of improvement in the design of interventions is testing the applicability of existing behavioral theories and making necessary adjustments as needed. Unfortunately, few studies reviewed in this project explicitly stated a theoretical framework to guide the intervention components and its evaluation. While it was possible to relate components to a theoretical construct, as shown in Table 1 below, it is a better planning strategy to start with the theory and then develop appropriate components instead of vice versa. It has been suggested that interventions have been unsuccessful not only because they are too diffuse and of insufficient dosage but also because they lack theoretical integrity (Anderson et al., 2000). As stores and other stakeholders design interventions, they should consider using one or several behavioral science theories related to food choice, including the knowledge/attitude model; diffusion of innovations theory; health belief model; social cognitive theory; theory of reasoned action; and the stages of change theory (Nestle et al., 1998). Involving nutritionists and behavioral scientists in the process can make the theories more user friendly.

Table 1: Summary of Social Ecological Levels and Related Grocery Store Interventions

Level of Influence	Important/Relevant Factors	Examples of Grocery Store Interventions
Individual	Taste preferences	Taste tests, Not adequately evaluated
	Knowledge/Attitudes	Pamphlets, brochures, and/or signs
	Self-efficacy	Shelf labels, demonstrations, recipes
	Perception of health risks	No examples
	Fast paced lifestyle, convenience	No examples
Household	Family prompts	No examples
	Income's effects on food spending	Coupons, price reductions, and recruit families to participate in subsistence programs
	Fast paced lifestyle, convenience	No examples
Social Environment	Cultural or social norms	No examples
	Advertising	Mass media
Built Environment	Access to grocery stores	Grocery store shuttle, Not adequately evaluated
		Opening stores in urban areas, Not adequately evaluated
	Shelf space dedicated to healthy options	Inventory of products offered, Not adequately evaluated
	Price reductions	Coupons and store sales, Not adequately evaluated

This project also demonstrates the usefulness of applying the Social Ecological Theory to identify how and where grocery stores can intervene to effectively address the obesity epidemic. As a hypothesized model, it does need to be tested and evaluated. However, without such a

framework, interventions in the retail setting risk becoming individually based programs offered in a grocery store instead of being a comprehensive health promotion effort. As shown in the table above, grocery store interventions have omitted potentially important aspects of food choice at the individual, household, social, and environmental levels.

Lastly, it is important for retail grocers to collaborate with local stakeholders as a strategy to: 1) Build both the store and community's capacity to improve dietary quality in their community; 2) Ensure that interventions are appropriate and applicable to the people. While building these relationships will take time, it is time well spent to ensure local commitment to the project and greater overall impact. However, partnerships should not just be limited to the retail sector. An analysis similar to this one should be conducted for other relevant industries and key stakeholders if our efforts to address the obesity epidemic are to be strategic and comprehensive in nature.

APPENDIX A

SUMMARY OF GROCERY STORE INTERVENTIONS

Intervention	Setting	Components	Level of Influence	Food Choice Constructs	Evaluation	Outcome
Anderson et al 2001: Nutrition for a Lifetime	5 recruited supermarkets but city and timeframe not provided	Interactive information system that offered nutritional advice and feedback to users	Individual	Self-efficacy, goal setting, outcome expectancy, and price	Intervention participants were compared to controls at baseline, intervention, and follow-up	Intervention group was more likely than controls to attain certain nutritional goals at posttest and follow-up.
Birmingham et al 2004: Market Basket Booklet Project	Women enrolled in WIC in three sites in Washington State; 2001	Booklet with recipes, selection and storage tips related to fruit and vegetables	Individual	Self-efficacy	Pre-post survey	Increased mother's confidence in handling fresh produce and they served more fruits and vegetables but it did not increase fruit and vegetable consumption among the mothers.
Cotugna & Vickery 1992: Learn to Eat Smart to Reduce Cancer Risk	Two chain stores in suburban area of New Castle County, Delaware; No date given	1 minute video placed in produce dept. that addressed the role of specific nutrients in body and tips of choosing food sources	Individual	Knowledge	In-store interview using convenience sampling strategy	26% of those who agreed to be interviewed watched the video. Of those who viewed the video, 44% correctly identified the theme. 17% reported that they purchased an item because of the tape. There was a statistical relationship between intention to buy an item and immediate purchase made.
Culp & Cassady 2005	Grocery stores serving low-income communities in 2 contiguous counties in CA; 2003	Outreach materials and applications for Food Stamp Program, food demonstrations, nutrition education materials, and recipes	Individual and Household	Knowledge, self efficacy, taste preferences, income	Tracked number of materials handed out. Post intervention telephone survey of participants who filled out food stamp applications	Yolo County: 5 people of the 25 who completed the interview received food stamps and they all were satisfied with the application process. Only a few used a recipe. Sacramento County: 2 people out of the 8 who completed an interview received food stamps and they all were not very satisfied with the application process.

Intervention	Setting	Components	Level of Influence	Food Choice Constructs	Evaluation	Outcome
Dougherty et al 1990: Nutrition Lifeline	Three chain stores in New Jersey suburbs; 6 month intervention but year not provided	Tested effectiveness of two educational methods: 1. videos plus activities conducted by on-site nutritionist 2. print materials only	Individual	Knowledge and self-efficacy	Pre/post survey and store sales data	Presence of an on-site nutritionist did not influence consumer knowledge or behavior, nor did the use of educational videocassettes produce behavior change
Ernst et al 1886: Foods for Health	Giant Food supermarkets in Washington DC and Baltimore; 1978-1979	Educational materials, shelf signs, promotional items, recipes	Individual	Knowledge and self-efficacy	Survey and sales data for Washington DC stores served as intervention and Baltimore stores were controls	Telephone survey indicated increase in awareness and knowledge among intervention customers but sales data showed no significant difference in food trends
Hunt et al 1990: Four Heart Program	Three supermarkets and one family owned market in Pawtucket, RI; 1983-1988	Brand specific shelf labels, brochures, recipes, promotions (contests and screenings)	Individual	Self-efficacy and knowledge	Multiple cross sectional exit interviews conducted annually that tested recall and use of labels	15% more were aware of labels, 18% more were encouraged to purchase labeled items, and 13% more correctly identified store label in 1988 than in 1984.
Kristal et al 1997: Demonstration Cancer Control Project for Iowa Farmers	Eight Hy-Vee supermarkets located in rural Iowa; September 1993-May 1994	Supermarket flyer that identified fruits and vegetables on sale and included recipes and coupons; store signage to identify fruits and vegetables in flyer; awareness activities like food demonstrations and educational signage	Individual and Environment	Taste preferences, knowledge, self-efficacy, store price	Exit interviews and take home surveys that used a random design were compared to controls at baseline and 1 year post randomization	At follow up, 43% of intervention shoppers and 7% of control shoppers recalled seeing a flyer. 36% of intervention store shoppers used a coupon and 18% used a recipe. There was no difference in the percentage of shoppers who bought fruits and vegetables between the control and intervention sites.
Lang, Mercer et al 2000: M-Fit Supermarket Shelf Labeling Program	Chain grocery stores serving Detroit, MI; Sept. 1997	3763 brand specific shelf labels and promotional materials (banners, posters, and signs)	Individual	Self-efficacy	Self reported awareness and use of labels as measured by 10 question exit interview. No control groups used.	29% aware of program (African Americans and those getting a cholesterol/blood pressure screening in last year were more aware of program); Of those aware 56% used the labels.

Intervention	Setting	Components	Level of Influence	Food Choice Constructs	Evaluation	Outcome
Levy 1985: Special Diet Alert	Giant Food supermarkets in Washington, DC and Baltimore; 1981-1983	Brand specific shelf labels and nutritional guide	Individual	Knowledge and self-efficacy	Survey and sales data for Washington DC stores serves as intervention and Baltimore stores were controls	Relative market share of shelf labeled products increased 4-8% more in intervention stores than in controls.
Mayer et al 1989	Review of 6 interventions found in grocery stores including Ernst et al 1986 and Levy 1985					
Mullis & Pirie 1988: Lean Meats Make the Grade	Three stores in Mankato, MN; three weekends in fall of 1984. Four stores in Fargo/Moorhead; four weekends in May 1985	Training for meat managers, taste testings, recipes, educational materials, product labels	Individual	Knowledge, attitudes, and self-efficacy	Sales from 5 intervention and 2 controls stores were obtained. Methods to evaluate awareness differed between two cities.	Respondents in intervention towns were more aware of the program and had better knowledge of lean meats and low-fat preparation methods. Meat price had greater influence on sales than did educational information, however, there was greater interest in lean cuts in intervention stores.
O'Laughlin et al 1996: Shop for Your Heart	Five retailers located in a low-income neighborhood in Montreal; 4 month intervention in 1993	Components were selected by store among in-store promotional items, special events and screenings, educational materials, taste demonstrations, recipes, supermarket tours	Individual	Knowledge, attitudes, self-efficacy, and taste	4 exit interviews using random selection during campaign, telephone survey at 3 months post campaign, interviews with store management	Shopper Interviews: 52% of shoppers who completed interview were aware of the program; 22% read the educational material or participated in an event; 18% were aware of the recipes and 7% took one; 18% were aware of the taste testing and 7% participated; 6% took a pamphlet. Community Survey: 18% were aware of the program and 3% participated in one or more of the activities

Intervention	Setting	Components	Level of Influence	Food Choice Constructs	Evaluation	Outcome
Paine-Andrews et al 1996: Project LEAN	One large supermarket chain in urban Kansas city; no date stated	Demonstrations, coupons, and in-store sales	Individual and Environment	Taste preferences and price	Sales data and qualitative observations. Each targeted item served as its own control.	Low to moderate increases in product purchases were found for lower-fat counterparts of milk, frozen desserts, and salad dressings.
Sloane et al 2003: African Americans Building a Legacy of Health	Comparison of stores located in low-income areas of Los Angeles with higher income areas; February 1999	Community-based process to inventory items offered in local food stores	Environment	Accessibility and availability	Statistical comparisons of the inventory results were completed for the combined target areas and the contrast areas, as well as between the individual target areas.	The variety and quality of fresh produce was significantly lower in the target areas, products like 1% milk, skim milk, low-fat/non-fat cheese, soy milk, tofu, whole grain pasta and breads, and low-fat meat and poultry items were significantly less available.
Reger et al 1999: 1% Or Less Campaign	Wheeling, West Virginia; February-March 1996	Paid advertisement on television, radio, and newspapers promoting 1% milk; public relations events to generate news coverage	Social	Social norms	Milk sales data. Pre-post telephone surveys. Comparisons were made to a control city.	In the intervention city, low-fat milk sales increased from 29% of overall milk sales to 46% in the month following the campaign. The increase was maintained at the 6 month follow-up. From the telephone surveys, 34.1% of high-fat milk drinkers reported switching to low-fat milk in the intervention community compared with 3.6% in the control.
Roders et al 1994: Eat for Health	Giant Food supermarkets in Washington DC and Baltimore; 1987-1989	Brand specific shelf labels, educational bulletin with recipes, brand specific nutritional guide	Individual	Knowledge, attitudes, self-efficacy, and possibly social norms	Survey and sales data for Washington DC stores served as intervention and Baltimore stores were controls	Self report survey data did not show any significant differences in consumption, but people were more knowledgeable about diet-disease linkages. Sales data showed a significant difference in purchases of fresh produce, frozen vegetables, and canned vegetables in the intervention stores.
Winnett et al 1991: Nutrition for a Lifetime	Kroger Co., Inc. but no city cited; Study 1 ran 1988-1989. Study 2 ran June-Nov. 1989	Interactive nutrition information system that offered nutritional advice and feedback to users	Individual	SCT, HBM, Communication principles (goal setting and feedback)	Intervention participants were compared to control participants at baseline, during the intervention, and at follow-up	Receipt data showed that during intervention and follow-up significant differences favoring certain high fiber or low-fat options were found.

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