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4-2014

## Translational Nutrition: A Review of the Application of Nutrition Science, Regulation, and Outreach Case Study: Farm Fresh Rhode Island

Eliza Zalis  
*Providence College*

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Zalis, Eliza, "Translational Nutrition: A Review of the Application of Nutrition Science, Regulation, and Outreach Case Study: Farm Fresh Rhode Island" (2014). *Public & Community Service Student Scholarship*. 2.

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Translational Nutrition: A Review of the Application of Nutrition Science,  
Regulation, and Outreach  
Case Study: Farm Fresh Rhode Island

Providence College  
Department of Public and Community Service

Eliza Zalis

Rick Battistoni

Amy Pettine

Providence, Rhode Island

April 2014

How does information affect people? There are hundreds of avenues by which individuals learn health-related information. Television, magazines, newsletters, advertisements, social media, culture, habits, environment, and input from others are just some of the factors that influence the way an individual thinks about health. It seems that a person can hardly go through a normal day without hearing about health-related issues. This is not surprising; a person's health is inextricably connected to his or her life and general well-being. On an average day, a man might wake up, eat breakfast, and go to work. By the time he arrives at work, this person has already made many decisions that impact his health. How much sleep did he get the night before? Does he suffer from any chronic pain? What did he eat for breakfast? Does he drink a caffeinated beverage? Did he take any medicine? Did he drive to work? Did he walk? Did he use public transportation? His wife may have reminded him about a dentist appointment. His daughter might be sick with the flu. He may have listened to a segment about ways to reduce his risk of developing Alzheimer's disease on the radio or picked up a magazine about golf and tennis on his way into his office. Maybe his cereal box touted the heart health benefits of whole grain. Within a few hours of waking up, most people have already been inundated with information about health. It seems that nearly any decision can be said to have some effect on the health of a person. By understanding health as an issue so fundamental that it cannot be separated from the life of the individual, it becomes clear that the influences of peoples' understanding of health are incredibly important. Information about health includes more than tips for disease prevention. Health information cannot be separated from social factors, politics, economics, culture, and education.

One crucial component of health is nutrition. A person's nutrition and eating habits play a major role in his or her general health and risk for developing diet-related diseases. In recent decades, research conducted in the field of nutrition has increased dramatically. Undoubtedly, existing knowledge in the field of human nutrition has great potential to influence the health of individuals, but the proliferation of advances in nutrition science can lead to confusion for individuals. This report examines the avenues by which existing knowledge and new information in the field of health and nutrition impacts individuals.

Translational nutrition is a multidisciplinary endeavor involving nutrition science, food science, and health science, all underpinned by basic life sciences and requiring clear communication (Green, Bladeren, and German, 2013). Translational nutrition seeks to integrate nutrition science within society. Advocates of translational nutrition recognize the need for existing knowledge and new research in to be translated into forms that can be incorporated into society. There are a number of ways to incorporate nutrition information into society, including public policy and government regulation, advertising, and outreach programs. Here, I examine some tactics of translational nutrition, including strategies that target the avenues by which information about nutrition and health impacts individuals.

## **Regulation**

Because nutrition is such an integral part of public health, the United States government plays a role in regulating the publication of nutrition information on food products. What is today known as the Food and Drug Administration (FDA) began as a regulatory body in 1906, when the US government passed the Pure Food and Drug Act. Since then, the FDA has evolved within the ever-changing landscape of food safety and public health. Today, the FDA works in a variety of ways to ensure consumer safety and public health. There are two methods by which the FDA regulates nutrition information publication on food products: (1) the Nutrition Facts panel, which provides a uniform format and clear display containing important nutrition information, and (2) regulation of front-of-package labeling.

### *Nutrition Facts Panel*

The Nutrition Facts panel is a source of nutrition information aimed to help consumers be aware of the nutrient content and potential health impacts of the foods they purchase and consume. It contains product-specific information about serving size, caloric content, fat content, sodium values, vitamin content, and amount of fiber. These values are designed to help consumers evaluate relevant nutrition information and make informed food choices. On March 7, 2014, the FDA proposed several changes to the Nutrition Facts panel. All changes are aimed at making it easier for consumers to understand the nutrition information on packages. The changes include minor formatting changes and some changes in vitamin values represented. One major change includes the addition of an “Added Sugars” column, which would make it possible for consumers to monitor more carefully their

intake of sugars. It is recommended that most individuals should limit the added sugar in their diet. If this value were represented on the nutrition facts panel, it would allow consumers to make informed choices about foods with added sugar. In addition to the information about added sugars, the FDA has proposed that the new panel contain more relevant and important information about vitamins. Further, the FDA proposed doing away with the number of “calories from fat,” because it is believed that this value is not useful in helping consumers and not as relevant to human health as was formerly believed. Another proposed change is to reevaluate and adjust serving size portions so that the size on the panel is more realistically representative of the amount of a food that a person might consume. Finally, the proposed changes include an increase in the size of the text that represents the total caloric content in a serving size. Together, these changes might make it easier for individual consumers to understand the nutrient content of the foods they purchase and consume.

It is interesting to look into the motivation behind the FDA’s proposed changes. The Nutrition Facts panel was originally designed to help consumers understand and evaluate the nutrient content of their food purchases. The FDA reports that an increasing number of consumers are using the Nutrition Facts Panel to guide their food choices. They cite data from their 2002 and 2008 Health and Diet Surveys, which found that the number of consumers who read the food label increased from 44% in 2002 to 54% in 2008. This increase shows an increasing awareness of the importance of nutrition and an increasing consumer desire for relevant information. The FDA is committed to a simple design of the Nutrition Facts panel that informs consumers of essential nutrition information. These proposed changes have a clear goal: to make nutrition information more accessible to

average consumers. The FDA articulates their motivation in proposing changes to the existing Nutrition Facts panel:

*The FDA’s proposed new Nutrition Facts label will make it easier for consumers to make informed decisions about the food they eat. The label reflects the latest scientific thinking about nutrition and the links between what people eat and chronic diseases like obesity and cardiovascular disease. FDA is proposing changes to the label based on new nutrition and public health research, the most recent dietary recommendations from expert groups, and input from [other groups] and various citizens’ petitions.*

The FDA’s role is to mandate and regulate exactly what information is presented on the Nutrition Facts panel. Their goal is to make information available to consumers. It becomes evident upon further exploration, however, that the FDA’s hope is that their role in regulating the information on food labels might promote good nutrition and health in ways more far-reaching than just providing individuals with information. In 2006, when the FDA began mandating that “trans fat” values be displayed on the Nutrition Facts panel, food manufacturers worked to significantly reduce the amount of trans fat in food products. Food companies felt pressure to reduce the amount of trans fats in food products in order to present a product that appealed to consumers as a healthy food choice. In a statement regarding the proposed changes, the FDA expressed hope that the proposed label changes “may encourage manufacturers to reformulate existing products and offer new products with a healthier nutrition profile” (FDA, 2014).

Figure 1: Original

<b>Nutrition Facts</b>	
Serving Size 125g	
Amount Per Serving	
<b>Calories</b> 65	Calories from Fat 2
% Daily Value*	
<b>Total Fat</b> 0g	0%
Saturated Fat 0g	0%
Trans Fat	
<b>Cholesterol</b> 0mg	0%
<b>Sodium</b> 1mg	0%
<b>Total Carbohydrate</b> 17g	6%
Dietary Fiber 3g	12%
Sugars 13g	
<b>Protein</b> 0g	
Vitamin A 1%	Vitamin C 10%
Calcium 1%	Iron 1%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

NutritionData.com

Figure 2: Proposed

<b>Nutrition Facts</b>	
<b>8 servings per container</b>	
Serving size 2/3 cup (55g)	
Amount per 2/3 cup	
<b>Calories</b>	<b>230</b>
% DV*	
<b>12%</b>	<b>Total Fat</b> 8g
<b>5%</b>	<b>Saturated Fat</b> 1g
	<b>Trans Fat</b> 0g
<b>0%</b>	<b>Cholesterol</b> 0mg
<b>7%</b>	<b>Sodium</b> 160mg
<b>12%</b>	<b>Total Carbs</b> 37g
<b>14%</b>	<b>Dietary Fiber</b> 4g
	<b>Sugars</b> 1g
	<b>Added Sugars</b> 0g
	<b>Protein</b> 3g
<b>10%</b>	<b>Vitamin D</b> 2mcg
<b>20%</b>	<b>Calcium</b> 260mg
<b>45%</b>	<b>Iron</b> 8mg
<b>5%</b>	<b>Potassium</b> 235mg

\* Footnote on Daily Values (DV) and calories reference to be inserted here.

### *Front-of-Package Labelling*

In addition to the Nutrition Facts panel, The FDA regulates food labels by determining what a food manufacturer is permitted to print on the front of a food package. The FDA exercises this power in order to prevent misleading information from being printed on a label. For example, a label for flavored coffee creamer, which has not been shown to directly contribute to a reduction in cardiovascular disease and is relatively high in fat when compared to other foods, could not be printed with a label that claimed that the product was low in fat and sugar and helped prevent cardiovascular disease. Put simply, the FDA regulates front-of-package labels in order to prevent false or confounding information from confusing or misleading consumers.

Interest regarding front-of-package labeling began to grow in 1984, when Kellogg's Cereal company began to advertise the connection between a food product and an individual's health on the front of some food's labels. What piqued the interest of food producers was the increase in sales that was attributed to the health claim. In 1984, Kellogg's campaign to promote high-fiber cereal as a way to reduce the risk of cancer demonstrated to food producers and policy-makers that health claims are beneficial to food product companies since they boost sales and consequently market shares of specific products. In the past three decades since food companies began to explore this territory, the FDA has begun to implement regulations for health claims on food labels. This is due in part to increasing awareness about health benefits of foods and a generally improved knowledge of human nutrition. The potential for increased sales as a result of placing health claims on food labels has also contributed to the attractiveness of health claims for food producers. In order to regulate front-of-package labeling, the FDA enlists individuals

and teams verify health claims. These teams monitor the legitimacy of claims and review relevant evidence in order to back up claims. This group's responsibility is to work through a carefully structured procedure to verify a health claim before it is considered legitimate and permitted to be printed on a food label. This procedure involves identifying and evaluating scientific literature that has been published regarding the nutrient or health benefit in question. For example, before a pomegranate juice company can print a label that claims that the product promotes heart health, they must submit relevant literature to the FDA regarding the biochemical action of particular flavonoids and vitamins in the human body. Understandably, the review process involves extensive consideration and study of human health, microbiology, physiology, and biochemistry. The review relies on existing knowledge and new discoveries in the fields of gastroenterology, oncology, and immunology. It can take months or years for a single claim to be reviewed and approved. The FDA depends on a number of employees to carry out the review and approval procedure.

Dr. Essie Yamini is one such individual. On February 6<sup>th</sup>, 2014, Dr. Yamini gave a lecture to a group of graduate students at the Tufts Friedman School of Nutrition Science and Policy. She presented for a course called "Health Claims and the Food Industry." Dr. Yamini works at the FDA in the Center for Applied Food Safety and Nutrition. She has worked extensively with industry giants and policy makers in regulating food labels. Most recently, she has worked on the regulatory side of health claims on food packaging. She is involved in the process of reviewing scientific literature to back up health claims. In her presentation, Dr. Yamini indicated a growing need for a "strict approach" in regulating health claims on food labels.

In 1990, the Nutrition Labeling and Education Act (NLEA) was signed into United States federal law. The NLEA was intended to clear customer confusion about food and nutrition, help consumers maintain healthy food choices, encourage innovations by prompting manufacturers to develop healthy foods for consumers, and level the playing field in making health claims. The NLEA provided for mandatory and voluntary placement of nutrition information. The FDA began to require mandatory inclusion of information in a Nutrition Facts panel. Included under the category of voluntary information are (1) nutrient content claims when defined by the FDA and (2) health claims when allowed by the FDA. These voluntary claims are verified and regulated by the FDA. One type of claim is a structure/function claim. Most commonly used on drug labels, this type of claim indicates that a food or dietary supplement affects the structure of function of the body. Types of structure/function claims include statements such as “builds strong bones” or “supports the immune system.” Another type of label claim is a nutrient content claim (NCC). These claims directly or by implication characterize the level of a nutrient in a food and are sometimes called “descriptor claims.” Some examples of NCCs include “low fat,” “very low sodium,” or “good source of vitamin C.” These types of claims may require a disclosure statement such as “see nutrition facts panel for levels of cholesterol.” Nutrient content claims are used to reveal the amount and levels of nutrients in food products. A third type of label claim is a supported health claim. These claims can take several years to be authorized by the FDA. The United States Congress has set a standard for substantiation of health claims on food labels. A health claim on a label indicates a relationship between a substance (namely, the food) and a disease or health-related condition. Until 2003, health claims on food labels had to be supported by significant scientific agreement (SSA). In 2003,

the FDA held that consumers benefit from having more information on food labels. This was part of the Consumer Health Information for Better Nutrition Initiative of 2003. As part of this initiative, the FDA began to allow qualified health claims (QHCs) to be included on food labels. These claims do not have to meet the SSA standard. The FDA states that “SSA health claims require significant scientific agreement based on the totality of publicly available scientific evidence ...Qualified health claims are still based on the totality of publicly available evidence but the scientific support does not have to be as strong as that for significant scientific agreement” (FDA, 2006). Dr. Yamini noted that a QHC must include qualified language and be based on credible scientific evidence. The FDA permits companies to use qualified health claims (QHCs) on food labels, but demands that QHCs be worded in a way such that consumers are not misled about the nature of the supporting science. QHCs are often made in the cases of emerging but incomplete scientific evidence. In the process of verifying a health claim, the FDA reviews scientific evidence and relevant published studies. Dr. Yamini outlines the process of review of the scientific evidence:

1. Regulatory review. This review verifies that a proposed substance meets the definition of a substance in the health claim regulation. In this step, the FDA determines that the food product in review is safe and lawful.
2. Identification of relevant studies. This includes studies submitted by the petitioners (the food company) and identified by FDA researchers. These studies must
  - a. Involve healthy humans
  - b. Measure the substance of interest
  - c. Measure the reduced risk of disease or health-related condition
  - d. Measure validated, modifiable risk factors

3. Classification of studies. The FDA differentiates between (1) intervention studies, which fit the gold standard criteria and include randomized control trials and (2) observational studies, which are often cross-sectional case studies.
4. Rate studies for methodology. The FDA examines study design, data collection techniques, inclusion and exclusion of study subjects, and statistical methods and analysis.
5. Determination of strength of relevant evidence.

In order to better understand the regulation of health claims on food labels, I met with Dr. James Tillotson, a professor at Tufts Friedman School of Nutrition Science and Policy in Boston, Massachusetts. Dr. Tillotson teaches the course called Health Claims and the Food Industry. In speaking with Dr. Tillotson, I developed an understanding of the role of the FDA in determining what a food manufacturer is permitted to print on a food label. During Essie Yamini's presentation of the procedure of approving food package labels, Dr. Tillotson challenged the review process. He pointed out that many of the studies that are used in verifying health claims were not designed for regulatory purposes. He was of the opinion that it would be more useful for the FDA to use studies that were performed with the intention of legitimizing health claims. In addition to critiquing the FDA's process of selecting relevant literature, Dr. Tillotson called into question the quantity of studies that the FDA considers sufficient to back up a health claim. Dr. Yamini insisted that the process varies for each case, but Dr. Tillotson was not satisfied with her answer. Unrelenting, he inquired what might be an average number of studies that the FDA would use to verify a proposed health claim. She responded that it might be typical that the FDA use two strong

studies in order to deem a claim legitimate. Dr. Tillotson's displeasure with this number was apparent; it seemed that he believed that the FDA should review a larger number of studies in the process of qualifying health claims. Dr. Yamini did not disagree; she too believed that the FDA would be a stronger regulatory body if they were able to use a greater number of relevant studies in verifying health claims. Part of the difficulty in this issue is simply a lack of research. Although research in the field of nutrition and human health is increasing, the effects of particular foods on human health is a nuanced and complicated field of study. In many cases, it is possible that only one or two studies regarding a particular nutrient have even been published.

In speaking with Dr. Tillotson, I was able to hear about his opinions regarding food labeling. He applauded the work that the FDA does in working to make nutrition information available to consumers. He did express some concern, however, about the process of verifying health claims on food labels. He seemed to believe that the potential to increase product sales could motivate food producers to petition for illegitimate or misleading health claims on food labels. Certainly, his concern is valid. The risk of false or misleading nutrition information guiding consumer food choice could have major public health implications. This potential risk reinforces the need for strong evidence in the process of verifying and regulating health claims.

### *Conclusion*

As knowledge about the role of diet and nutrition in health and disease improves, credible nutrition research becomes more valuable to consumers. The role of regulation of food package labels is indeed one of the most direct means of providing consumers with

information regarding the nutrition and potential health impacts of the food products they purchase and consume. The FDA's role in regulating food labels provides consumers with reliable nutrition information. As my discussions with Dr. Tillotson and Dr. Yamini illustrate, however, there is always room for improvement in the process of verifying the evidence that is used to back up nutrition information. Certainly, the process will never be perfect, but the FDA seeks to use only the most thorough and credible studies in qualifying nutrition information on food labels. Dr. Yamini acknowledged that a stricter approach is needed in the process of reviewing studies in order to improve the quality of proof. As researchers make advances in studying nutrition, the standards for evaluation will be raised. As the tools and study of nutrition science improve, the FDA will be able to implement stricter guidelines for the process of verifying legitimate health claims. In coming years, it is likely that even the expectation for what constitutes "legitimacy" in the field of food label regulation will evolve as nutrition science evolves.

In *The Politics of Fat: Food and Nutrition Policy in America*, Laura Sims writes, "food standards historically have been enforced by the FDA...to protect against economic adulteration of the food product, rather than used as a policy instrument to protect or enhance the public health of consumers" (Sims, 159). It is clear, especially in the cases of regulating front-of-package health claims, that the FDA plays an indispensable role in reviewing, monitoring, and ensuring legitimacy of nutrition information on food label. Additionally, the FDA requires that certain information be presented accurately on the Nutrition Facts panel of food labels. The Nutrition Facts panel provides a standard and uniform presentation of nutrition information that is relevant to human health. The purpose of these types of regulations is to provide information to consumers so that

individuals might be able to make informed choices about food in light of a food's potential impacts on their health. The FDA's assumes responsibility for verifying claims and regulating labels. This type of regulation has an impact beyond informing consumers, however. As Sims points out, the FDA often uses its power less as a policy instrument and more as a regulatory tool. Yet the FDA's regulatory role has far-reaching impacts in the food industry. As we have seen, it is to a food producer's advantage to display positive nutrition information on a food label. Therefore, the FDA's standards may promote the production of food products that have positive impacts on an individual's health. This is only possible, however, if the FDA remains a trusted and legitimate regulatory body. We have seen that the mandatory presentation of nutrition information on the Nutrition Facts panel can encourage food producers to develop products that promote good nutrition and health. It would not be enough to advertise on a front-of-package label that a food product promotes good health; companies must actually produce foods that truly do promote good health. Therefore, it is imperative that the FDA maintain its integrity as a trusted regulatory agency, which requires that it review sufficient evidence in the process of verifying health claims on food labels.

Federal regulation of nutrition information is an important part of public health policy. Since food labels are so prolific, regulation is a widely accepted practice of translational nutrition. The FDA is responsible for the regulation of food labels, which is a complicated duty. The presentation of nutrition information on food label will likely continue to evolve in order to meet the needs of individuals and consumers. One of the principles of translational nutrition is the clear communication of nutrition information. As advances continue to be made in nutrition science, communication of nutrition information

will continue to develop so that consumers have access to information that is relevant to their nutrition and health.

### *Health Literacy*

*Food labeling has long been viewed by nutrition educators and consumer advocates – and, occasionally by regulatory agencies – as one of the most direct and efficient means of providing nutrition information about food contents to consumers. Whether or not it is an “effective” means of helping consumers make informed food choices depends in large measure on what information is provided and whether consumers understand and can use that information in making food choices.*

Laura Sims

*The Politics of Fat: Food and Nutrition Policy in America*

Sims captures the sentiment of many nutrition experts in the above passage: the impact nutrition information will have on an individual depends largely on the individual's capacity to understand and apply the information. A person could be presented with thorough and articulate information about a food product, but if the individual cannot – for whatever reason – comprehend the information, it cannot have an impact on the person's choices or health. This is just one reason that translational nutrition is such a central issue in public health. Translational nutrition seeks to make information about nutrition and health available and accessible to individuals in society. Translational nutrition takes a multifaceted approach to reaching the individual. One facet of translational nutrition includes consideration of health literacy. In exploring the methods of translational nutrition, it is impossible to ignore the issue of health literacy. Health literacy is defined by the Academy of Nutrition and Dietetics as “the degree to which individuals obtain, process, and understand basic health information and services to make informed health decisions”

(Academy of Nutrition and Dietetics, 2012). It is a stronger predictor of health than age, income level, employment, education, or race. Individuals with poor health literacy skills are less able to interpret and act on health information; thus, poor health literacy can perpetuate disease and reduce effective disease management. Therefore, health literacy is of paramount significance in the field public health. In the subject of nutrition, health literacy concerns the ways that an individual makes sense of nutrition information found in the media, on food labels, and in publications.

In 2012, a research group published a review of the way that health literacy is measured in the field of public health. This group found that major health literacy gaps exist in society. These are the gaps that translational nutrition seeks to bridge. Naturally, there are opportunities in the field of translational nutrition to evaluate health literacy in order to assess effective strategies in translating nutrition information so that nutrition communications can have maximal impact on the health of individuals. This evaluation and assessment are part of the many responsibilities of those involved in nutrition communication. To explore health and nutrition communication in the context of health literacy, I interviewed Patrick Skerrett, editor of the Harvard Heart Letter and managing editor for digital media at Harvard Health Publications. Skerrett has worked for many years as an educator and a writer. He has worked in nutrition communication and teaches graduate courses on nutrition and public health communications. Skerrett recognizes that there are several distinct levels of health publication and that reaching different populations requires different approaches to communication and publication. For example, reaching a low-literacy population requires very different tactics from the strategies that might be used in reaching a group of educated professionals. In discussing nutrition

publications, we spoke about the importance of reaching target audiences. Are nutrition experts really reaching the people who would benefit most from nutrition information? In many cases, it seems not. The prevalence of diet-related diseases has increased in recent years, especially among low-income populations. Often, health publications are targeted for literate individuals and families. These populations typically have the financial resources to access information in magazines, newspapers, and online sources. Patrick Skerrett conceded that nutrition communication is a complicated territory. There is no single answer to the question of how to get information to the populations that could benefit the most from it. Skerrett believes that audio and video media hold much promise for reaching populations that are at risk for developing diet-related diseases. These media platforms, he says, have such potential because they do not rely on literacy or reading ability. They require only that an individual understand spoken language. Video can reach a very broad audience because it attracts visual attention and can appeal to individuals of almost any age. For this reason, information about health and nutrition can be communicated effectively by radio or video to a large number of people, even those individuals who might not have access to written health publications. One unique strategy that Skerrett has seen used in recent years is an information prescription. This idea has taken hold in health care facilities where physicians recognize a need for patients to gain information about health and disease. A physician might prescribe a website, giving a patient with diabetes a web address link to a website with basic information about his or her condition and resources for learning more and managing the condition. This strategy of information prescriptions is directly related to health literacy. Information prescriptions provide a means for health care providers to guide individuals to information that is relevant to their health. In the

case of nutrition, this strategy would target individuals with diet-related conditions and give them information about their nutrition and health. One significant drawback of this approach to translational nutrition is that it is an entirely reactive measure, only employed after a person has already developed a diet-related disease or condition. As such, although it may be an effective means of promoting health literacy, it is not a valuable tool in translating nutrition information to impact a person's health choices before he or she develops a diet-related disease or condition. In the 2012 report referenced above, the research group identified a need to use more comprehensive assessment approaches in investigating health literacy. These approaches must move beyond literacy and readability to address the full spectrum of health literacy factors. Further, the group calls for more robust experimental studies to examine the effectiveness of health literacy interventions among individuals, communities, health care providers, and health care systems. In the example of information prescriptions, there is indeed a need to evaluate this translational nutrition approach targeting health literacy. Only by evaluating attempts to improve health literacy will it be possible to understand the most effective ways of positively influencing individuals' knowledge of nutrition and health.

Health literacy, we have seen, is a major predictor of health. Undoubtedly, there are a number of challenges in communicating nutrition information. Poor health literacy is one of the most complicated challenges. It is clear, however, that promoting health literacy has great potential in influencing the health of individuals. What remains to be seen is how to most effectively employ translational nutrition strategies in order to positively impact the health of individuals.

## *Outreach*

We have seen that translational nutrition seeks to integrate nutrition information into the lives of individuals. One major challenge that exists in translating nutrition science into the day-to-day lives of individuals is that of poor health literacy. Above, we examined the role that the United States government plays in health promotion and disease prevention in the field of nutrition. We reviewed the role of the Food and Drug Administration in regulating nutrition information presented on food labels. Undoubtedly, food labels can influence consumers' knowledge of product-specific nutrition information. An individual's understanding of a food label, however, is dependent upon his or her knowledge of basic nutrition and understanding of health principles. In this way, the impact that food labeling can have on the health of individuals is contingent upon health literacy. For this reason, outreach strategies are sometimes helpful in promoting good nutrition and health. This is not to say that outreach programs are necessary in order to provide nutrition information to any person in society, but there are certain populations that are reached more effectively by outreach programs and initiatives that actively target certain groups.

In addition to the FDA, there is another government organization that addresses issues of nutrition. Within state governments, the Department of Health coordinates several programs that are designed to educate groups and individuals about the role of good nutrition in promoting good health. For example, the State of Rhode Island Department of Health organizes the Women, Infants, and Children (WIC) program for families in Rhode Island. The WIC program aims to provide education for optimal nutrition

during critical stages of growth and development. Further, the WIC program helps families that meet certain income guidelines purchase food based on nutritional needs. In addition to the WIC program, the Department of Health has launched a program called Initiative for a Healthy Weight, which seeks to address the growing number of individuals in Rhode Island who are overweight or obese.

In researching the State of Rhode Island Department of Health's work in nutrition, I had the opportunity to speak with Eliza Lawson, MPH and Program Director for the Department of Health's Initiative for a Healthy Weight, and Christopher Ausura, Food Systems Coordinator at the Department of Health. Eliza Lawson has worked previously with a campaign called Shape Up Somerville, an obesity prevention initiative in Massachusetts. In her experience with that public health intervention, she says she learned about effective strategies for conducting health and lifestyle interventions. She explained that the obesity prevention program in Massachusetts developed a multifaceted, comprehensive approach in promoting healthy lifestyle changes. A crucial part of this approach involved carefully assessing the needs of the community of Somerville. By asking participants what they perceived as challenges to a healthy lifestyle, the planning group was able to better focus their intervention program. Equally important, Lawson pointed out, was the increased community participation that was a result of their approach. By listening to the needs of the community they sought to impact, the group was able to encourage more community buy-in. There was a mutual trust and respect for each group's priorities and goals. Lawson's expertise is in developing health promotion strategies that target young audiences. In addition to her work with obesity intervention, she devotes much of her work to nutrition and health programs in schools. When asked about nutrition

initiatives in schools, Eliza Lawson expressed support for farm-to-school programs and special nutrition-based field trips or events, but insisted that nutrition should not be an isolated issue. Healthy eating and food choices, she believes, can be incorporated into the academic curriculum; such planning would help children develop healthy habits and impress upon students the importance of nutrition. Further, by scheduling time for physical activity, Lawson believes schools can play a positive role in promoting healthy lifestyle habits. She recognizes that there are many obstacles in enforcing nutrition programs in schools, such as cheap sugar-sweetened beverages and candy in vending machines, fundraising projects that revolve around selling candy or other sugared snacks, and influential advertising for sugared food products. Despite these challenges, however, Lawson is optimistic about the future of nutrition in schools. She appreciates that nutrition is an issue with implications in many areas of health, and believes that public awareness of the importance of nutrition will continue to increase. As it does, so will support for nutrition-focused public health initiatives.

Christopher Ausura, who works in the State of Rhode Island Department of Health with Eliza Lawson, is similarly optimistic about the future of nutrition in the field of public health. He worked for several years with the WIC program. He explained some of the strengths of the WIC program, including the stringent guidelines for what can be purchased with WIC dollars in comparison to other government food assistance programs. These guidelines, he believes, encourage participants to purchase more produce, which promotes good health. Additionally, the WIC program provides nutrition counseling sessions for participants so that families at high nutritional risk can receive personal advice and guidance regarding their nutrition and health. Ausura agreed that is nutrition hardly an

isolated issue; that it must be involved in discussions across sectors: in politics, economics, education, public health, social work, transportation, agriculture, and communications. He says he often thinks of Maslow's hierarchy of needs and reminds himself that families who can barely afford to buy groceries are not likely to be concerned with the type of food they are purchasing, so long as they have something to eat. For this reason, he insists that educating people about the role of nutrition in good health is crucially important.

A common theme in my discussions with Eliza Lawson and Chris Ausura was the importance of gauging where the need in a community lies. If a group or organization designs a nutrition intervention that is overwhelming or intimidating for individuals in a community, it is unlikely to have positive outcomes. For instance, if a person is inundated with nutrition information and demands of lifestyle habit changes, the person is likely to feel too overwhelmed to adopt any lifestyle changes. A more effective approach would involve making the individual comfortable with proposed lifestyle changes and ensuring that he or she has enough nutrition information to make informed choices, but not overwhelming the individual. Lawson and Ausura are all too familiar with the challenges in nutrition and health communication. The populations that the Rhode Island Department of Health works with include many individuals and families who live in poverty. These populations rarely have access to health information in the same way that more financially stable populations might. As Ausura said, even if these individuals were presented with nutrition information, it is unlikely that they would have the resources to make major lifestyle changes in regards to nutrition and health.

In the 2013 Journal of the Academy of Nutrition and Dietetics, a council reported on findings and general trends in consumer knowledge, attitudes, and behavior in making food

choices. Their study is by no means comprehensive, but provides a basis for evaluation of nutrition communication in the United States. The report states, “Communications must reach consumers where they eat, work, and play and include strategies that both inspire and guide them on how to make healthful behavior changes” (Hornick, Childs, Edge, Kapsak, Doohar, and White, 2013). We have seen that nutrition communication is a nuanced issue. The consensus among public health experts and nutritionists is that current approaches in nutrition communication have not facilitated the establishment of long-term healthy habits in diet and nutrition. In the absence of effective facilitation of such habits in a society that is experiencing growth in knowledge of and interest in human nutrition and health, some private organizations have formed with the express purpose of promoting public knowledge of nutrition. Different groups employ different strategies in pursuing this goal, but most organizations incorporate some form of nutrition education strategies. Nutrition education aims to improve health literacy by developing skills in interpreting and understanding nutrition information. Nutrition education programs can be designed to target a specific group or population. Here, I investigate an organization based in Rhode Island, Farm Fresh Rhode Island (FFRI). Farm Fresh Rhode Island approaches nutrition and health in a number of different ways; I focus on their programs that involve outreach and nutrition education.

## **Case Study: Farm Fresh Rhode Island**

Farm Fresh Rhode Island is a nonprofit organization. Established in 2004, it has experienced rapid growth in its first ten years. Its objectives are as follows: (1) preserve Rhode Island farmland and agricultural and culinary knowledge, (2) build healthier communities, (3) increase access to fresh food, (4) improve the impact of food production and distribution on our environment, and (5) strengthen community-based businesses. Farm Fresh Rhode Island has a dual interest regarding nutrition. First, the organization is committed to improving the health of individuals through healthy food. Furthermore, FFRI seeks to promote healthy, fresh, and local food to support the communities in the Rhode Island area. By recognizing both the public health and community economic aspects of food systems, FFRI encourages individuals and businesses to recognize the many ways food impacts the lives of individuals. FFRI has a number of programs that seek to improve access to healthy foods. Among these programs are farmers' markets in Providence, RI and surrounding areas, school nutrition education programs, and food distribution programs. Below, I outline FFRI's organization of farmers' markets and their facilitation of government food assistance benefits at farmers' markets. I include reports of several of their outreach programs, two of which (Bonus Bucks and Healthy Foods, Healthy Families) offer financial incentives for individuals and families to purchase foods at farmers' markets. Finally, I analyze the strategies that FFRI uses in nutrition education by exploring their Healthy Foods, Healthy Families program.

## *Farmers' Markets*

FFRI organizes more than ten different farmers' markets in Rhode Island throughout the year. During the summer months, the organization coordinates many markets in the region of Providence and beyond. The size and hours of these markets vary. During the winter, FFRI organizes a large indoor farmers' market that is open twice a week, where nearly seventy farmers and vendors sell fresh fruits and vegetables, breads, dairy, meat, poultry, seafood, and artisan food products. The markets that FFRI organizes provide an opportunity for residents of Rhode Island to learn about food systems, seasonal produce, growing techniques, and local farms, but this is not what makes these farmers' markets unique. FFRI integrates a nutrition component into farmers' markets by working to improve access to healthy foods. The markets offer a convenient way for individuals who are committed to fresh and local food to purchase food. The individuals and families who are already committed to healthy foods, however, are not the only population that FFRI seeks to serve. The organization invests considerable time, effort, and resources into reaching the individuals and families who do not consider nutrition or healthy food a top priority. With this goal of reaching out to individuals and families who do not prioritize nutrition, FFRI organizes outreach programs to influence nutrition and health of individuals and families in Rhode Island.

Farm Fresh Rhode Island focuses much of its outreach on individuals and families who qualify for government food assistance programs. These programs, the Supplemental Nutrition Assistance Program (SNAP) and Women, Infants, and Children (WIC), are commonly referred to as "food stamp programs" and are used to provide food for low-income families. These government benefits can be redeemed at farmers' markets in the

same way that they can be used at grocery stores. Farm Fresh Rhode Island encourages low-income families who are enrolled in these benefit programs to buy groceries at farmers' markets. Compared to grocery stores, farmers' markets offer fewer processed and packaged food products and proportionally more fresh fruits and vegetables, which promote good health. In 2007, Farm Fresh RI began facilitating SNAP and WIC benefits transfer at farmers' markets in and around Providence. That year, five markets offered SNAP and WIC benefit transfer. In 2008, one more market was included in the initiative, bringing the total number of participating farmers' markets to six. In 2009 there were eleven participating farmers' markets and in 2010, the total number jumped to seventeen. In 2011 there were nineteen, then twenty in 2012. In 2013, there were twenty-two farmers' market in Rhode Island at which families who were enrolled in the SNAP and WIC programs could redeem their benefits and purchase food. Farm Fresh Rhode Island follows government procedure in facilitating the redemption of SNAP and WIC benefits at farmers markets. An individual can swipe his or her EBT (Electronic Benefits Transfer) card in a terminal machine in exchange for tokens, which they can then spend like cash at the farmers' market.

It can be difficult to study the way that SNAP and WIC benefits are used at farmers' markets, but Farm Fresh RI has recorded an increase in spending of government benefits at farmers' markets over the past several years. On a national scale, SNAP spending at farmers' markets has increased. Between 2009 and 2010 there was an 81% increase (\$4,173, 323 to \$7, 547, 028) in the amount of SNAP dollars spent at farmers' markets in the United States. Between 2010 and 2011, there was a 55% increase (\$7, 547, 028 to \$11,725, 316) in total SNAP dollars spent; in 2012 there was another 42% increase in the

amount spent at farmers' markets (\$11,725, 316 to \$16, 598, 255). These numbers indicate a gross increase in the total amount of dollars spent at farmers' markets in the United States. It is clear that the numbers are increasing, but it is even more interesting to look at the percentages of total SNAP funds disbursed that were redeemed at farmers' markets during these years. Table 1 compares the percent of total SNAP spending in the United States to SNAP spending in Rhode Island. Nationally, there was an increase in the percentage of total SNAP spending at farmers' markets. In Rhode Island, there is a consistently larger percentage of total SNAP dollars that were redeemed at farmers' markets, compared to the United States as a whole.

*Table 1*

Percent SNAP Redeemed at Farmers Markets				
	2009	2010	2011	2012
<b>US</b>	0.008%	0.012%	0.016%	0.022%
<b>RI</b>	0.012%	0.013%	0.020%	0.025%

Figure 3

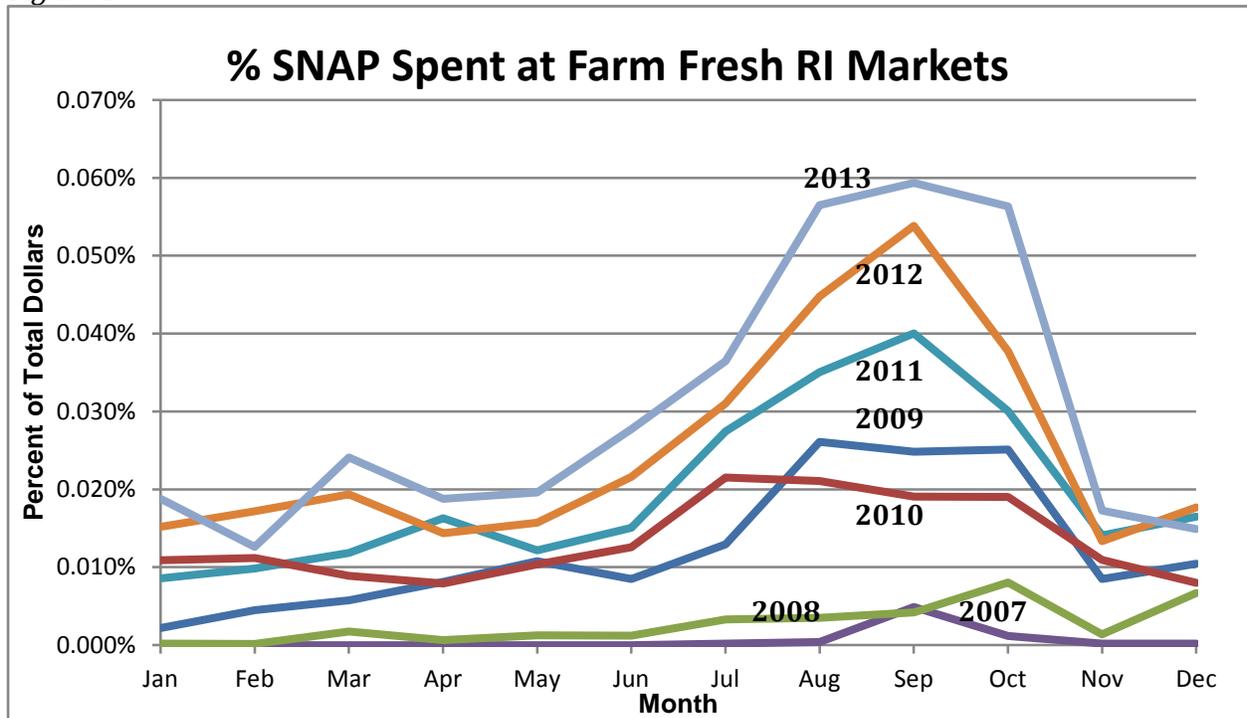


Figure 3 shows the nine-year history of the percentage of SNAP dollars spent at farmers' markets facilitated by Farm Fresh RI. This graph is especially useful in analyzing the increase of SNAP spending; since it reports the percentage of dollars spent, it is an accurate representation of the increase as a proportion of total overall SNAP funds disbursed, which has also increased in recent years. The data represented in Figure 3 shows the increase in the percentage of total SNAP dollars that have been spent at farmers' markets. This increase has been made possible by Farm Fresh Rhode Island. As part of their mission of improving access to healthy food and fresh, local produce, FFRI coordinates the transfer of government benefits through the SNAP and WIC programs. This commitment makes it possible for low-income families in Rhode Island to buy food at farmers' markets. In this way, Farm Fresh RI helps improve access to nutritious food, including locally grown fruits and vegetables.

### *Bonus Bucks*

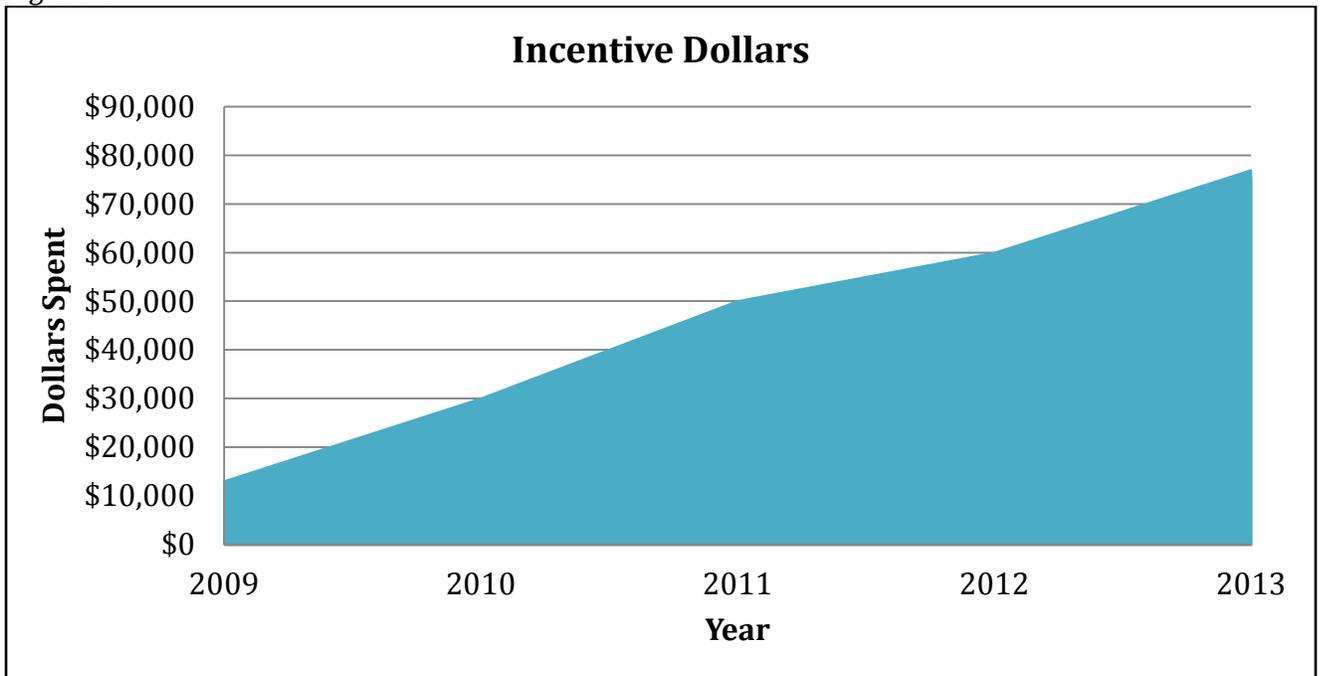
Farm Fresh Rhode Island advertises its markets to individuals and families across Rhode Island. They emphasize that SNAP and WIC dollars can be used to buy food at the market by displaying informational posters and fliers in English and Spanish at farmers' markets and community organizations. The goals of the organization include improving access to healthy foods for low-income individuals (especially those who qualify for government food assistance) and increasing the number of SNAP benefit dollars spent at the farmers' markets. In addition to facilitating the spending of SNAP and WIC benefits at farmers' markets, Farm Fresh Rhode Island also coordinates a program that is aimed specifically at providing financial incentives for individuals and families who qualify for government food benefits to buy food at farmers' markets.

Individuals who do not qualify for government food assistance and do not have cash can use their credit card to get tokens at FFRI's farmers' markets. The individuals who receive SNAP or WIC benefits, however, receive extra Bonus Bucks tokens to use in addition to whatever principal dollar amount of tokens they received. The Bonus Bucks program awards forty percent of the principal amount in Bonus Bucks tokens. The only restriction is that Bonus Bucks tokens can only be used for fresh produce. Thus, the financial incentive promotes the purchase of fruits, vegetables, and herbs (and not jams or baked goods, for instance). For example, if a customer uses his or her EBT card to receive twenty dollars of tokens at a market, that person could use those tokens to purchase any food from vendors at any of the FFRI farmers' markets. The individual would also receive eight dollars (40% of the principal amount of twenty dollars) of Bonus Bucks to be used to purchase fruits or vegetables.

This financial incentive program is one example of many programs across the United States that seek to promote the purchase of healthy foods and produce among low-income populations by encouraging individuals who use government food assistance benefits to buy food at farmers' markets. Since 2009, when FFRI began implementing the nutrition incentive program, the purchasing of produce facilitated by FFRI's incentive programs has increased dramatically (Figure 4). In 2009, \$15,000 of incentive dollars were spent at the FFRI farmers' markets. By 2013, that number had increased to more than \$77,000. Part of this increase is due to the expansion of the markets themselves. The audience reached by FFRI markets also increased during that time, meaning that more individuals could attend the farmers' markets and therefore more individuals could make use of the Bonus Bucks program. The dramatic increase in the amount of incentive dollars spent at FFRI's farmers' market indicates an effective nutrition outreach impact. Any incentive dollar spent is spent by a low-income individual or family. It is therefore evident that FFRI is successful in their goal of facilitating the purchase of produce among SNAP and WIC participants and encouraging good nutrition and health among low-income populations.

Funding for the Bonus Bucks program comes from private organizations. Citizens Bank, Wholesome Wave, June Rockwell Levy Foundation, The Rhode Island Foundation, Bank RI, City of Providence, Frederick C. Tanner Memorial Fund, Feinstein Foundation, and individual donors.

Figure 4



### *Nutrition Education*

Bonus Bucks is just one example of the many outreach programs that Farm Fresh RI organizes. They also coordinate nutrition education programs for children, families, and seniors.

Healthy Foods, Healthy Families is one of FFRI's nutrition education programs. The program is designed for families who participate in government food assistance programs SNAP or WIC. Healthy Foods, Healthy Families consists of several series of education events at farmers' markets throughout Rhode Island. For four months of the year, parents and caregivers can bring children to any one of seven farmers' markets in the state to participate in nutrition education workshops and activities. The curriculum that FFRI develops is designed to appeal to children and families. The program provides financial incentives to encourage participants to purchase fresh fruits and vegetables at the farmers'

market. Families receive money to be spent on produce at the farmers' markets. Healthy Foods, Healthy Families does more than just encourage families to buy more produce, however. The program is designed to have an impact within homes, at the tables of the families who participate. It aims to encourage families to increase their actual consumption of fruits and vegetables. In addition to the incentives to purchase fruits and vegetables, the nutrition education component of the program provides recipes, cooking tips, and activities to expose children and families to new foods. Each week, Healthy Foods, Healthy Families offers activities like cooking demonstrations and tastings to engage children and families with healthy foods. The Healthy Foods, Healthy Families program is designed to reach a diverse population of children and families and therefore tailors its services and curriculum to the populations it serves. The families that participate in the program often speak Spanish as their first language. Years ago, FFRI recognized the need for a bi-lingual curriculum and developed exactly that. Furthermore, the FFRI staff and volunteers who work with the Healthy Foods, Healthy Families program speak Spanish and can converse with the families who participate in the program but are uncomfortable communicating in English. This feature of the program is a tremendous help to low-income families who might not otherwise feel comfortable shopping at the farmers' market or enrolling in the nutrition education program.

FFRI has articulated five goals of Healthy Food, Healthy Families:

- Increasing fruit and vegetable consumption
- Increasing knowledge of nutrition and encouraging healthy relationships with food for parents and their children
- Offering parents and caregivers the tools necessary to make healthier choices while shopping for food
- Raising awareness of Farmers' Markets in these communities as a place to purchase affordable, high quality fruits and vegetables.
- Celebrating diverse food traditions as a means of fostering community among program participants

Since the program began in 2009, it has expanded. In recent years, FFRI has begun to collect outcome data in order to measure the successes of the program and analyze the opportunities to improve the program. FFRI distributes surveys to the participating families of the program in order to gather feedback from the participants. In 2011, 286 families enrolled in the Healthy Foods, Healthy Families program. In 2012, the number of participating families leapt to 400. FFRI had to cap the number of families at that number due to limited funding. The program is funded by the Blue Cross Blue Shield of Rhode Island, the van Buren Charitable Foundation, the Fresh Sound Foundation, Seven Stars Bakery, and CVS Caremark.

Another program the FFRI organizes is designed to target older populations in Rhode Island. Healthy Servings for Seniors is a nutrition education program that is comprised of a six-week curriculum that aims to teach seniors about making healthy food choices and increase fruit and vegetable consumption among participants. Like the Healthy

Foods, Healthy Families program, this program for seniors reaches out to low-income individuals. Coupons and tokens to be used at farmers' markets are incorporated into the program. The program includes visits to farmers' markets, cooking demonstrations, and games. The sessions are offered at five different senior housing sites and senior centers in the Providence area. Healthy Servings for seniors is a relatively new program. In 2012, FFRI reached 212 seniors through the program.

Today, 2,651 farmers' markets in the United States are registered to accept government food assistance program benefits. The number of nutrition education programs like Healthy Foods, Healthy Families is on the rise. Farm Fresh Rhode Island is just one example of an organization committed to promoting good nutrition and health. But what makes FFRI so successful in reaching individuals and effecting healthy lifestyle changes? There is no singular reason that FFRI is able to have such a positive influence in the field of nutrition and nutrition education. Farm Fresh RI's strategies are by no means perfect - there is always room for improvement - and FFRI hopes to continue to expand its sphere of influence so that it might make nutrition outreach programs available to even more families and individuals. Though imperfect, FFRI does display some exemplary outreach strategies. The Healthy Foods, Healthy Families program, in particular, is one outreach program that embraces the idea of making nutrition information accessible to individuals and families.

Farm Fresh Rhode Island's Healthy Foods, Healthy Families program works to reach individuals and families where they are. As Mikayla Moretti, coordinator of the Healthy Foods, Healthy Families program states, their goal is to provide enough nutrition information for families to be challenged to begin to make gradual lifestyle changes, but

never so much information that a family feels overwhelmed with information or instruction. When asked to explain the Healthy Foods, Healthy Families programs, Moretti said:

*HFHF is an interactive nutrition education program for low-income families at urban neighborhood farmers markets. As such, our curriculum is based upon nutrition and food systems and the inherent relationship between health and how our food is grown and what we eat... We know nutrition and food education can be overwhelming so we keep it simple by providing one clear take-home message per session. We offer this curriculum in conjunction with weekly tastings and financial incentives. So we've combined healthy food access with nutrition education and resources and support and financial incentives. We also intentionally operate HFHF at farmers markets that accept both SNAP and WIC benefits (offering a 40% bonus for all SNAP customers...), allowing families to utilize their federal benefits at the market, and receive the financial bonuses from HFHF. Our families are low-income constituents, meaning that they likely do not have disposable income to experiment with new fruits and vegetables. Studies show that repeated exposure is key for children to accept new fruits and vegetables. With HFHF, families are encouraged to try a new sample at the market every week, bring home the (simple) recipe, and try it out with their kids.*

This statement gets at the core of the mission of FFRI's outreach programs. Their goal is to effect real change in the habits and lives of individuals. Healthy Foods, Healthy Families seeks to assess the nutritional needs of a family and offer a manageable amount of nutrition information. In communicating with Moretti, I asked how HFHF has evolved to effectively meet the needs of the population that the program seeks to serve. She pointed to the evolution of the HFHF curriculum as an indicator of the development of the program. The curriculum is available in English and Spanish and FFRI is always looking for ways to tailor the program to most effectively meet the language and cultural needs of the participating families. FFRI has a staff with the language capabilities and the cultural resources to reach diverse populations. This enables the HFHF team to communicate effectively with the participants in the program. Additionally, FFRI has developed unique projects and

activities for different age groups, so that the curriculum actively engages children of participating families, whether they are five years old or fifteen years old.

Later in my conversation with Mikayla Moretti, I asked about the strategies FFRI uses to reach out to new families to encourage participation in HFHF. She explained that FFRI does a considerable amount of outreach to educate families about the program. They display posters for the farmers' markets and fliers about HFHF, call upon community partners to share information with clients, promote HFHF on a Spanish radio station, and run trainings for WIC nutritionists and staff members throughout the state. FFRI informs the staff about HFHF and how to refer WIC clients to the farmers' markets and HFHF. Evidently, there are some opportunities for overlap in the world of nutrition education. HFHF is a powerful resource; to have WIC staff refer families to the programs has great potential to benefit the families who participate in the WIC program. It became clear in my research of the Healthy Foods, Healthy Families program that this FFRI initiative is a trusted source of nutrition and health information in communities in Providence and a valuable resource for state agencies that seek to promote nutrition and health. In addition to active outreach, HFHF gains many new participants by word of mouth. Families who have had positive experiences with HFHF tell friends and family about HFHF, encouraging them to enroll in the program. This type of communication helps the influence of HFHF reach further than it might otherwise be able to. It is certainly an effective method of spreading the word about HFHF; hopeful families line up at farmers' markets to enroll in this program.

Healthy Foods, Healthy Families, we have seen, is a program that seeks to incorporate access to healthy foods with an education component, including information

about nutrition and health. FFRI hopes to convince participants that the farmers' market is a welcoming place and a viable source of nutritious food. Moretti agrees that it is not enough to set up farmers' markets and expect people to flock to them. Nutrition outreach must include the educational piece that helps people understand what a farmers market is, where the food comes from, and the role of nutrition in health. Once individuals and families are physically present at the market, the nutrition information becomes tangible. This is part of what makes HFHF a successful nutrition education program. It incorporates access to healthy foods and nutrition information with relevant information and demonstrations about the importance of healthy food choices.

Farm Fresh Rhode Island's approach to nutrition education is exactly in line with what we have identified as effective strategies in translational nutrition and nutrition outreach programs. FFRI recognizes that traditional nutrition and health publications often do not reach the populations that could benefit most from nutrition information. As Eliza Lawson and Christopher Ausura of the State of Rhode Island Department of Health explained, nutrition and health information must be accessible for individuals and reach people where they are. Patrick Skerrett spoke about the same idea; that nutrition information can only be conveyed successfully if it is published or transmitted with the needs of the audience in mind. Most of the individuals and families that FFRI serves in outreach programs live in poverty. They often do not have access to a plentitude of health publications or nutrition information. Rather than publish high-profile literature about food and nutrition, Farm Fresh Rhode Island designs and implements programs that reach out to individuals and families to improve access to healthy, fresh foods and nutrition information. This access to nutrition information and education is what makes it possible

for FFRI to effect long-term changes in lifestyle and habit. They work to organize and manage farmers' markets across Rhode Island. At these markets, individuals and families can learn about produce and food sources. People can learn about new fruits and vegetables, exchange recipes, or learn a little bit more about the role of nutrition and health. In a more formal approach to nutrition education, FFRI coordinates programs like Bonus Bucks and Healthy Foods, Healthy Families, which target low-income families who might not otherwise have special interest in nutrition. These programs give families who qualify for SNAP or WIC government assistance programs extra incentive money to shop at farmers' markets to buy fresh fruits and vegetables. The programs that FFRI organizes are designed to appeal to broad audiences; the organization hopes to reach as many people as possible in order to have the largest impact on nutrition and health possible.

### *Conclusion*

How does information affect people? As we have seen, there are a number of paths by which information can influence individuals. Within the fields of nutrition and health, we have explored the regulatory side of translational nutrition and the outreach side of translational nutrition. We have also examined different strategies of nutrition communication. Further, we have investigated a case study of Farm Fresh Rhode Island in order to better understand nutrition education and outreach programs. We have presented statements from interviews with a variety of professionals who work in public health and nutrition, including conversations with Christopher Ausura and Eliza Lawson from the State of Rhode Island Department of Health, Mikayla Moretti from Farm Fresh Rhode Island, James Tillotson from the Tufts Friedman School of Nutrition Science and Policy,

Patrick Skerrett from Harvard Health Publications, and Essie Yamini from the United States Food and Drug Administration.

In examining the role of the United States federal government in regulating nutrition information on food labels, we explored the process of reviewing evidence for health claims and the impact that nutrition information on food labels has on consumer food choice. We saw that nutrition information on food labels can help consumers make informed decisions when the information is clear and can be understood. In "*How Do Consumers Use Nutrition Label Information?*" authors Higgison, Kirk, and Rayner suggest that in order for consumers to use nutrition label information effectively to facilitate healthy food choice, consumers must be educated on nutrition information. In other words, consumers must understand the nutrition information that is presented on a food label in order to make use of that information. Indeed, as Patrick Skerrett articulated, any person working to translate nutrition information so that it can be understood by average consumers must communicate with a target audience in mind. As he says, the people who might benefit most from nutrition information often do not have the resources or ability to seek out, understand, and apply nutrition information. In order to effectively reach populations at high risk of developing diet-related diseases or conditions, groups involved in nutrition communication must develop innovative and creative communication strategies, which might include utilizing new and different sources of media. Some groups develop concrete outreach programs in order to convey nutrition information in a way that maximizes the impact of nutrition and health information. Some outreach programs develop nutrition education modules in order to address poor health literacy, which, as we have seen, is a significant challenge in nutrition communication and public health. Nutrition education

outreach often aims to develop health literacy skills and in doing so, improve individuals' abilities to recognize, understand, interpret, and apply nutrition information. In the case study of Farm Fresh Rhode Island, we explored the methods used in reaching individuals and families. In many cases, the populations that FFRI tries to reach are groups with low health literacy. Many of FFRI's programs, especially the Healthy Foods, Healthy Families program, aim to expose individuals to new information about nutrition. For example, one week's curriculum of the Healthy Foods, Healthy Families program might incorporate a lesson on turnips, teaching families why this vegetable is good for their health and sharing recipes about how to cook and prepare the vegetable. This type of comprehensive approach is part of what makes FFRI effective in providing nutrition information to individuals and families. The model is an exemplary one though because it aims to help establish long-term healthy habits for families. Many families who participate in HFHF would not typically feel comfortable shopping at a farmers' market or asking for advice about food and nutrition, but HFHF provides the opportunity for these families to receive nutrition information and even provides guidance about how to form healthy habits.

Nutrition information can be communicated in a variety of ways. Some people will be well versed in the language of nutrition science and be capable of interpreting health claims on food labels. Some people will understand the basics of the Nutrition Facts panel and use it to loosely guide food choices. Some people will not be able to read the Nutrition Facts panel. Some people will pay for monthly subscriptions to health newsletters. Some people will get daily emails about nutrition and a healthy diet. Some people will hardly be able to afford to buy groceries at all and will purchase whatever food they can afford. Some people will not be able to understand what their doctor is saying when he recommends a

change in diet. Regardless of where a person lies on the spectrum of health literacy, it is important that there be nutrition information available.

## Literature Review

There has been considerable research in the last fifty years on the topics of health promotion and nutrition. This paper will focus on translational nutrition research and explore the ways in which scientific nutrition research influences individuals.

Due to a rise in documented deaths attributed to diet-related causes in recent decades, branches of research in medicine, epidemiology, biochemistry, public health, social science, psychology, and economics have expanded to investigate food and diet patterns. There is no shortage of literature on nutrition, public health initiatives, and dietary programs. Here, I focus on two popular health promotion strategies in the field of nutrition: (1) government-regulated nutrition labeling and (2) social outreach influence, including cultural and economic influences on consumer behavior. Further, I explore the call for nutrition education.

## Relevance

In a report by the American Society of Nutrition, a working group collaborated to develop nutrition research needs whose advancement would provide the greatest impact on health and well being. The group emphasizes the importance of nutrition in the health, development, and functionality of humans and in the prevention and treatment of disease. The working group's findings are a broad list of research needs that they hope will elucidate strategies that can be applied in health promotion and disease prevention. The research needs they identify are as follows: 1) variability in individual responses to diet and foods; 2) healthy growth, development, and reproduction; 3) health maintenance; 4) medical management; 5) nutrition-related behaviors; and 6) food supply/environment

(Ohlhorst, Russell, Bier, Klurfeld, Li, Mein, Milner, Ross, Stover, and Konopka, 2013). This list of high-priority areas is general and broad, but calls for a variety of research and application strategies to be employed in conducting and applying nutrition research. The final two needs (5 and 6) have special potential for application and are therefore of particular interest when considering the potential to influence individuals. The authors specifically address the need to explore the link between behavior and food choices. They propose four factors that may drive individual food choices: government policy, environmental cues, cultural differences, and communication tools such as social networking and food marketing. Though they offer few concrete methods of conducting or applying nutrition research, the authors speak strongly to the importance of promoting health through diet and nutrition.

A publication for The Institute of Food Technologies expands the idea of clinical research as it applies to individuals by introducing the idea of translational nutrition, which the authors define as “a multidisciplinary endeavor involving nutrition science, food science, and health science, all underpinned by basic life sciences and requiring clear communication” (Green, Bladeren, and German, 2013). The publication is material published by the Institute of Food Technologies and concludes with a challenge for scientists and health promoters involved in nutrition: to provide consumers with continually advanced scientific understanding between nutrition and health. The publication does not seek to conceal its agenda: it aims to stress the importance of nutrition education. It is unique in that it recognizes that the scientific community is continually making strides toward further understanding the link between nutrition and health and encourages nutrition educators to learn more about translational nutrition in order to keep

pace with scientific progress. Other reports on the impact of media on food choice similarly emphasized the importance of nutrition communications keeping pace with nutrition research (Shiratori and Kinsey, 2011).

A crucial element in applying nutrition research in the public sphere in a way that impacts the health of individuals is translation of research and effective communication of nutrition information. In a public health study, researchers found that there is widespread interest for nutrition information on food packages, that consumers like the idea of simplified front of pack information, and that consumers tend to understand nutrition information that is presented to them (Grunert and Wills, 2007). This study is not one-of-a-kind; similar studies (Cowburn and Stockley, 2005), support the idea that consumers do, in fact, use nutrition labeling in selecting food products.

In the 2013 Journal of the Academy of Nutrition and Dietetics, a council reported on findings and general trends in consumer knowledge, attitudes, and behavior in making food choices. Their study is by no means comprehensive, but provides a broad basis of evaluation of nutrition communication in the United States. The report states, “Communications must reach consumers where they eat, work, and play and include strategies that both inspire and guide them on how to make healthful behavior changes” (Hornick, Childs, Edge, Kapsak, Doohar, and White, 2013). The group conducted consumer research surveys to develop a general assessment of consumer nutrition knowledge. They conclude that current approaches to nutrition education have not facilitated established, long-term healthful habits.

Together, the reporting of Grunert and Wills and the report of the 2013 Journal of the Academy of Nutrition and Dietetics provide some context for the topics that this paper

will explore: the methods by which individuals receive nutrition information, the influence that these sources have, and potential opportunities to change and improve nutrition education.

### **Influences on Food Choice**

There is no clear-cut consensus on exactly what motivates individuals' food choices. Studies of consumer behavior have shown that there is a wide range of factors that influence an individual's food purchasing choices. There is no single factor that is a primary influence; rather, taste, cost, environment, ethical concern, nutritional content, perceived health benefit, convenience, brand image, social influences, cultural tradition, and other factors influence a consumer's choices (French, 2003; Glanz, 1998; Wright, Nancarrow, and Kwok, 2001).

There are a variety of economic perspectives that seek to understand consumer behavior. No theory completely accounts for the varying influences that impact consumer food choice, especially since such influences carry different weight for different individuals and often depend on situation and circumstance. However, a number of studies have been conducted to better understand what influence product image can have on consumer behavior. Especially relevant are studies that observe actual consumer behavior, not merely stated preference or intent of purchase (Koster, 2009). Some studies look specifically at functional foods, which are foods that have supposed health benefits (e.g. alleviation of symptoms of aging or illness). Such studies have found that (1) consumer characteristics, (2) purchasing situation, and (3) product characteristics influence consumer acceptance of functional foods (Bornkessel, Bröring, and Omta, 2011). It has also

been observed that influences similar to those that impact food choice also impact consumer's opinions about functional foods. These influences include taste, convenience, and cost (Urala and Lähteenmäki, 2003). Research on functional foods, since it is more focused than general research on food marketing, provides specific and valuable insight into motivations of food choices and the role of nutrition that is lacking in general food choice studies. It is therefore useful to consider these findings in evaluating the influence of motivators of food choice. The influences of taste, convenience, and cost are just a few of the factors that influence food choice, however. In recent years, food producers have begun to include health claims on food labels. The idea that health claims influence consumer food choice is the foundation of the study of functional foods as a product category. The fact that there is overlap within the category of factors that influence food choice of functional foods and those that influence non-functional foods provides reason to consider the findings of studies of consumer perception of functional foods in the discussion of consumer food choice. In other words, it is possible to analyze the influence that health claims have on food choice and consumer behavior. Indeed, marketing and advertising research groups have found that health claims do influence consumer perception of food products.

In *Food Trends and the Changing Consumer*, Senauer, Asp, and Kinsey investigate consumer behavior and the influence of trends on food choice. They point out that it is not always easy for consumers to find and process product information. They identify four stages of the consumer decision-making process: 1) recognizing a need for information, 2) seeking out relevant information, 3) evaluating the information, 4) making a purchase decision, and 5) evaluating the product after its purchase and use. These stages are useful in considering the points of the purchase process in which consumers are influenced by

product information, including nutrition information. The authors of *Food Trends and the Changing Consumer* emphasize that product attributes are not necessarily just physical (i.e. the color of packaging) but may be psychological (i.e. brand image). Evidently, the way that a product is portrayed influences consumer impression of the product and therefore purchase decisions.

In a study investigating the impact of media on food choice, researchers found that popular media can be an effective communication approach in changing dietary behaviors to promote health. Shiratori and Kinsey (2011) found that nutritional information in popular media has a substantial impact on consumers' food choices. This study recognized that although nutrition research becomes available to the public in scientific journals, research journals are not likely to be a significant or direct information source for most consumers. The researchers conduct their research under the belief that consumers are likely to receive information through media sources other than research journals. The researchers measure consumer knowledge by tracking purchases. Since food purchases reflect the consumer's knowledge of and desire for products, the researchers examine the impact that nutrition information has on consumer demand. The researchers seek to better understand the impact of nutrition information on food purchases. They do this by specifying a "media index" and using computer-coded content analysis to track purchases and media impact (Shiratori and Kinsey, 2011). Their study provides a solid basis for a discussion of the influence of media sources on consumer behavior.

The way a brand markets a food product can influence consumer perception of food products and consequently influence consumer food choice. It is therefore possible for brand image and product image to utilize nutrition information to impact consumer food

choice. A brand may do this by including health claims in advertisements or on product packaging. A study by the American Marketing Association highlighted the importance of understanding how consumers use health claims, in conjunction with nutrition information, to form product evaluations. They use three different methods to address questions concerning health claims, nutritional information and context, and consumer product evaluation. First, the researchers examine product evaluations, including attitude toward a product, purchase intention, and nutritional credibility. The research group hypothesized that consumers would have a more favorable evaluation of food items when a health claim is presented than when no claim is made. Their findings supported their hypothesis. The study goes on to suggest potential implications for marketing and suggests that restaurants are likely to benefit from using health claims as promotional element and food producers could increase sales of food products by placing health claims on packaged foods. They note that this is especially beneficial when the audience of consumers is unlikely to further investigate health claims by using the nutritional facts label. One potential shortcoming of this study is their use and evaluation of purchase intention. Purchase intention is a valuable parameter, but does not necessarily indicate actual purchasing behavior. However, this study identifies a crucial element in understanding consumer motivation. The researchers effectively show that consumers are *interested* in health claims and that health claims do play a role in the way that consumers perceive products. This influence of health claim marketing is significant because it shows that consumers evaluate food products differently depending on health claims made about the food product. In this way, it is possible for food producers to influence consumer perception of food products in the way that they advertise and market food products. This study was conducted by a group that is

specifically interested in marketing; thus, their discussion is focused on the impact that marketing can have on consumer perception. Their suggestions at the conclusion of their study delve into the potential marketing impact of health claims on consumer behavior (Kozup, Creyer, and Burton, 2003).

The American Marketing Association designed a separate study to investigate whether consumers are able to evaluate the healthfulness of a product when a health claim and nutrition information (for example, information in a Nutrition Facts panel) appear together. Their results suggest that consumers are indeed able to do so. This study supports the idea that health claims and nutrition information have independent effects on consumers. However, the researchers' findings were not entirely conclusive due to their finding that contradictory health claims and nutrition information tend to confuse consumers. There are certainly implications of possible consumer confusion. If an unreliable health claim is made on a package label, it is possible that consumers might formulate food product evaluations based on the unreliable claim. Limitations of this study include the participant consumers. The participant pool was educated, with an average age of 30, and most were employed (88% employed). The researchers themselves emphasize the importance of similar studies conducted with participant pools that are more representative of typical consumer shopper populations (Ford, Hastak, Mitra, and Ringold, 1996).

## **Regulation**

The aforementioned American Marketing study (Ford, Hastak, Mitra, and Ringold, 1996) reveals the importance of health literacy. The Academy of Nutrition and Dietetics defines health literacy as “the degree to which individuals obtain, process, and understand basic health information and services to make informed health decisions.” It is a stronger predictor of health than age, income level, employment, education, or race. Health literacy is relevant in the field of nutrition because poor health literacy can perpetuate disease and ineffective disease management due to the fact that individuals with poor health literacy skills are less able to interpret and act on health information. A report by the Academy of Nutrition and Dietetics calls for more comprehensive health literacy assessments and recognizes the need for more vigorous evaluations of the effectiveness of health literacy interventions. Furthermore, they acknowledge the importance of exploring the role of health literacy on nutrition outcomes and the long-term effects of health literacy interventions on nutrition outcomes. The review calls for improved health literacy measures, readability assessments, experimental research studies, health literacy training for health professionals, and advocacy at the individual, community, and policy levels. Taken as a whole, this review provides a comprehensive look at opportunities for improvement in health literacy. This is particularly relevant in the discussion of health promotion and disease prevention in regards to nutrition. Nutrition education is a way to incorporate nutrition information communication with health literacy. What is interesting about this study is the fact that the authors address health literacy in the wider frame of overall literacy. They assert that since overall literacy levels are not improving among adults in the United States, it is essential that health messages be communicated in ways

that individuals can understand. This study emphasizes the accessibility of nutrition information and specific opportunities for improving health literacy (Carbone, Zoellner, 2012).

Laure S. Sims, in *The Politics of Fat: Food and Nutrition Policy in America*, states that nutrition labeling is one of the most efficient ways to provide consumers information about nutrition and food content, but stresses that the evaluation of its effectiveness depends on *what* information is provided and *whether* consumers understand and can use that information in making food choices. Sims proposes the question of what information – what kind and how much – is needed for consumers to make “informed” food choices, especially considering the numerous options consumers are presented with when purchasing food.

In *Food Politics*, Marion Nestle explores the interplay between the food industry and politics. The author explains how the Nutrition Labeling and Education Act came about and the influence it has had on food producers and food labeling. She speaks specifically about Kellogg’s All Bran campaign, which was a landmark marketing move that revealed the benefit of making health claims on labels. This was also a turning point in the history of government regulation of food labeling, because it prompted the FDA (Food and Drug Administration) to write regulations for the practice of making health claims. The history of FDA regulation, while interesting, is not of particular relevance to this paper, but it is pertinent to note the changes that have occurred in labeling policy since the dawn of the age of health claims. In 1984, the Kellogg’s campaign to promote high-fiber cereal as a way to reduce the risk of cancer demonstrated to food producers and policy-makers that health claims are beneficial to product companies since it boosts sales and therefore market

shares of specific products. Later FDA reports voiced doubts about the educational value of health claims compared to other sources of nutrition information. The author of *Food Politics* does not advocate for or against health claims on packaging, but provides an in-depth investigation of the political context in which health claims and the regulation of such claims arose.

The FDA has very specific regulations regarding nutrition labeling and the types of language than food producers can use on food packages. The FDA also requires certain information to be made available to consumer on the “Nutrition Facts” panel. These regulations make the nutrition facts a recognizable display on most food packages. The panel is a potentially useful tool for consumers to learn about the nutrients provided by certain food and make informed food purchases. The effectiveness of the “Nutrition Facts” panel is not completely understood, but one particular study investigated the ways that consumers use the panel in making food choices. The study seeks to bridge the gap between self-reported utilization of the nutrition facts food labeling panel and actual consumer use of the nutrition facts in order to better understand *how* individuals use the “Nutrition Facts” panel. The investigators found that product comparisons were the most popular use of the nutrition facts. By this, they mean that people most often used the “Nutrition Facts” panel to compare the nutrient content of different types and brands of products. Consumers did this in order to make a purchase decision. The investigators of this study conclude that although further research in the field is certainly needed, nutrition education is a promising route to improving consumer nutrition knowledge and consumer health (Higginson, Kirk, Rayner, and Draper, 2002).

## **Translational Nutrition**

Translational nutrition has been defined above as “a multidisciplinary endeavor involving nutrition science, food science, and health science, all underpinned by basic life sciences and requiring clear communication” (Green, Bladeren, and German, 2013).

Translational research itself is the application of credible scientific research so as to have an effect on individuals. Translational research may also be a vital part of federal public policy at each phase and for each type of research, providing a foundation for public policy development as it pertains to health. As a result, public policy may be seen as adaptive and as a translation of research and advancements in science and knowledge. (Serrano, Anderson, and Chapman-Novakofski, 2007). Nutrition research has special potential for application in public policy due to the fact that it is related to health and economics. That is, nutrition affects health on the individual, family, and community levels. Nutrition also affects disease and therefore has implication in public health. Even more, since nutrition involves food choices and purchases, translational nutrition has the potential to influence the food industry as a whole.

This paper’s coverage of translational research will seek to further elucidate strategies of translational nutrition and present suggestions for effective translational nutrition. This will likely incorporate policy and intervention strategies, taking into consideration factors that influence consumer food choice. Further, it will investigate nutrition education and seek to better understand the challenges and effective strategies used in nutrition education programs.

How does information affect people? Specifically, how do existing knowledge and new research in the fields of nutrition and health influence individuals? This project examines the avenues by which nutrition science impacts individuals in society. It examines the factors that influence consumer behavior and food choice and the importance of health literacy in guiding nutrition and health. It elucidates the role of the Food and Drug Administration (FDA) in regulating food labeling and the implications that regulation has on consumer perception and possible health outcomes. In investigating nutrition education and outreach programs, this project includes a case study of Farm Fresh Rhode Island and the organization's nutrition initiatives.

## Bibliography

Capaldi, Elizabeth D. *Why We Eat What We Eat: The Psychology of Eating*. Washington, DC: American Psychological Association, 1996. Print.

Carbone, Elena T., and Jamie M. Zoellner. "Nutrition and Health Literacy: A Systematic Review to Inform Nutrition Research and Practice." *Journal of the Academy of Nutrition and Dietetics* 112.2 (2012): 254-65. Print.

Cowburn, Gill, and Lynn Stockley. "Consumer Understanding and Use of Nutrition Labelling: A Systematic Review." *Public Health Nutrition* 8.1 (2005): 21-28. Web.

FDA. "U.S. Food and Drug Administration." *U S Food and Drug Administration Home Page*. FDA, n.d. Web. 24 Apr. 2014. <<http://www.fda.gov/default.htm>>.

Ford, Gary T., Manoj Hastak, Anusree Mitra, and Debra Jones Ringold. "Can Consumers Interpret Nutrition Information in the Presence of a Health Claim? A Laboratory Investigation." *Can Consumers Interpret Nutrition Information in the Presence of a Health Claim? A Laboratory Investigation* 15.1 (1996): 16-27. Print.

French, Simone E. "Pricing Effects on Food Choices." *The Journal of Nutrition* 133.3 (2003): 841S-43S. Web.

Green, J. Hilary, Peter J. Van Bladeren, and J. Bruce German. "Translating Nutrition Innovation Into Practice." Institute of Food Technologies, n.d. Web. 20 Nov. 2013. <<http://www.ift.org/>>.

Glanz, K. "Why Americans Eat What They Do Taste, Nutrition, Cost, Convenience, and Weight Control Concerns as Influences on Food Consumption." *Journal of the American Dietetic Association* 98.10 (1998): 1118-126. Web.

Grunert, Klaus G., and Josephine M. Wills. "A Review of European Research on Consumer Response to Nutrition Information on Food Labels." *Journal of Public Health* 15.5 (2007): 385-99. Print.

Higginson, C.S., T.R. Kirk, M.J. Rayner, and S. Draper. "How Do Consumers Use Nutrition Label Information?" *Nutrition & Food Science* 32.4 (2002): 145-52. Print.

Hornick, Betsy A., Nancy M. Childs, Marianne Smith Edge, Wendy Reinhart Kapsak, Carrie Doohar, and Christy White. "Is It Time to Rethink Nutrition Communications? A 5-year Retrospective of Americans' Attitudes toward Food, Nutrition, and Health." *Journal of the Academy of Nutrition and Dietetics* 1st ser. 113.January (2013): 14-23. Web. 13 Nov. 2013.

Koster, E. "Diversity in the Determinants of Food Choice: A Psychological Perspective." *Food Quality and Preference* 20.2 (2009): 70-82. Print.

Kozup, John C., Elizabeth H. Creyer, and Scot Burton. "Making Healthful Food Choices: The Influence of Health Claims and Nutrition Information on Consumers' Evaluations of Packaged Food Products and Restaurant Menu Items." *Journal of Marketing* 67.2 (2003): 19-34. Print.

Nestle, Marion. *Food Politics: How the Food Industry Influences Nutrition and Health*. Berkeley: University of California, 2002. Print.

Senauer, Benjamin, Elaine Asp, and Jean Kinsey. *Food Trends and the Changing Consumer*. St. Paul, Minn., U.S.A.: Eagan, 1991. Print.

Shiratori, Sakiko, and Jean Kinsey. *Media Impact of Nutrition Information on Food Choice*. Diss. Agricultural & Applied Economics Association's AAEA & NAREA Joint Annual Meeting, 2011. Pittsburgh, Pennsylvania: University of Minnesota, 2011. Print.

Sims, Laura S. *The Politics of Fat: Food and Nutrition Policy in America*. Armonk, NY: M.E. Sharpe, 1998. Print.

"State of Rhode Island: Department of Health." *Home: Rhode Island Department of Health*. Official State Site, n.d. Web. 28 Apr. 2014.

United States of America. U.S. Department of Health and Human Safety. Food and Drug Administration. *Proposed Changes to the Nutrition Facts Label*. By FDA. FDA, n.d. Web.

United States of America. U.S. Department of Health and Human Safety. Food and Drug Administration. *Guidance for Industry: FDA's Implementation of "Qualified Health Claims": Questions and Answers; Final Guidance*. N.p.: Center for Food Safety and Applied Nutrition (CFSAN), n.d. FDA. 2006. Web.

United States of America. U.S. Department of Health and Human Services. Food and Drug Administration, Center for Drug Evaluation and Research (CDER) Center for Biologics Evaluation and Research (CBER). *Guidance for Industry Exposure-Response Relationships — Study Design, Data Analysis, and Regulatory Applications*. Rockville, MD: FDA, April 2003. Web.

Urala, Nina, and Liisa Lähteenmäki. "Reasons behind Consumers' Functional Food Choices." *Nutrition & Food Science* 33.4 (2003): 148-58. Print.

Wright, Len Tiu, Clive Nancarrow, and Pamela M.H. Kwok. "Food Taste Preferences and Cultural Influences on Consumption." *British Food Journal* 103.5 (2001): 348-57. Print.

Yamini, Essie. "Health Claims, From the Regulatory Perspective." *Nutrition 226: Health Claims & the Food Industry*. Tufts Friedman School of Nutrition Science and Policy, Boston, MA. 6 Feb. 2014. Lecture.