Produce for Better Health Foundation

2010 Gap Analysis

The Fruit and Vegetable Consumption Challenge:

How Federal Spending Falls Short of Addressing Public Health Needs

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Produce for Better Health Foundation (PBH) is a non-profit 501 (c) (3) fruit and vegetable education foundation. Since 1991, PBH has worked to motivate people to eat more fruits and vegetables to improve public health. PBH achieves success through industry and government collaboration, first with the 5 A Day program and now with the Fruits & Veggies—More Matters public health initiative. To learn more, visit www.pbhfoundation.org and www.FruitsAndVeggiesMoreMatters.org.

Introduction

Nearly 20 years ago, in light of the growing recognition of the health benefits of eating fruits and vegetables, the federal government launched a path-breaking public-private partnership known as the 5 A Day Program. The initiative was premised on a growing body of data showing that most Americans were eating far less than the desired amount of fruits and vegetables, and accumulating scientific evidence indicating that increased consumption could help reduce the incidence of costly and deadly diet-related diseases, such as heart attacks and strokes.

Since that time, high-level officials in the federal government have made strong public statements embracing the need for increased consumption of fruits and vegetables in this country. Additional nutrition education efforts followed, particularly in conjunction with federal nutrition assistance programs, as did a series of studies illustrating that most U.S. residents do not meet the recommended daily levels for fruit and vegetable consumption.[1]

Down at the new White House kitchen garden, the first lady and Agriculture Secretary Tom Vilsack were helping a group of children plant seedlings as part of an effort to get them–and everyone else–to eat more fruits and vegetables.

–POSTING BY MARIAN BURROS, *NEW YORK TIMES* FOOD EDITOR, ON THE TIMES' "CAUCUS" BLOG, 4/9/09

Recently, Congress, in recognition of this continuing problem, mandated more than a hundred million dollars a year for a new nationwide fruit and vegetable purchasing initiative in the 2008 Farm Bill. The President and first lady, in an important public gesture, planted the first White House vegetable garden in decades and launched a highly visible program to advance healthier diets in an effort to confront the nation's growing obesity epidemic.

While these new initiatives represent important steps in the right direction, the question remains whether they signal a major shift in federal priorities. Congress funds, and the Executive Branch administers, a massive, multi-billion dollar food-and-public health complex. Whether the spending priorities of the numerous federal agencies within the U.S. Departments of Agriculture (USDA) and Health and Human Services (HHS) involved in these arenas reflect the challenges posed by the fruit and vegetable consumption gap and the diet-related diseases to which it contributes is an empirical question that this report endeavors to answer.

This report was developed as early preparations were being made for the next farm bill, which will allocate the bulk of federal food and agriculture funding, and as updates to the *2005 Dietary Guidelines for Americans* (Dietary Guidelines) were being revised. It explores the fruit and vegetable consumption gap and the question of whether federal spending priorities for food and agriculture adequately reflect the urgency of the diet and health challenges confronting the American people and its policy makers.

In this report, we use the 2005 Dietary Guideline recommendations, the diet-related risks associated with chronic illnesses, such as coronary heart disease, and the economic costs of diet-related diseases as frames of reference for an analysis of the extent to which the federal government has made fruits and vegetables a national public health priority.

The following primary research questions are addressed in this report:

- What are the stakes for public health and the U.S. economy associated with an unhealthy diet and inadequate fruit and vegetable consumption?
- Are Americans consuming the recommended levels of fruits and vegetables and to what extent have those consumption levels changed since the turn of the century?
- Does current USDA spending on major food groups adequately reflect the public health recommendations in the *2005 Dietary Guidelines for Americans*, especially regarding fruit and vegetable consumption?
- Does current spending by other non-USDA agencies, such as the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC), reflect the risks and costs of serious chronic illnesses associated with inadequate consumption of fruits and vegetables?
- Have changes in spending by federal agencies since the turn of the century reflected a greater or lesser commitment to disease prevention, nutrition, and fruit and vegetable consumption?
- What would it take to bring federal spending associated with fruits and vegetables in line with the importance of those foods to public health?

Section I of the report uses food consumption data to assess the current and historical relationship between actual fruit and vegetable consumption and recommended levels of intake in the Dietary Guidelines.

Section II determines the current economic costs of diet-related diseases, including the costs of the fruit and vegetable consumption gap, and examines how those costs have evolved over time.

The vast majority of federal spending that promotes the production and consumption of the major food groups in the Dietary Guidelines is administered by USDA. Section III of the report examines USDA spending on food grain (as opposed to feed grain for animals), meat, dairy, fats and oils, and fruit and vegetable food groups.

Section IV analyzes the extent and focus of spending by USDA on nutrition education programs designed to promote Dietary Guideline recommendations.

Section V of the report examines HHS research projects and disease-prevention activities that pertain to diet-related diseases to determine the extent to which spending on fruits and vegetables reflects the public health risks associated with the fruit and vegetable consumption gap.

Section VI assesses the degree to which the federal government has elevated fruits and vegetables as a spending priority by comparing federal commitments in Fiscal Year (FY) 2000 with those in FY 2008 and FY 2009.

The report concludes with an analysis of the changes in federal investment that would be needed to close the federal fruit and vegetable spending gap and a summary of major findings and policy-related recommendations.

High-level federal officials from USDA and HHS have extolled the health benefits of increased fruit and vegetable consumption and reiterated the need to commit additional federal resources to close the consumption gap that exists. Whether or not federal actions have been consistent with that rhetoric is an important public health question that can largely be answered through an examination of federal spending data.

When it comes to fruit and vegetable spending priorities, is the federal government walking the walk or just talking the talk?

I. The Ongoing Fruit and Vegetable Consumption Gap

Introduction

During the mid-to-late 1990s, the federal government conducted a comprehensive consumer survey known as the Continuing Survey of Food Intake of Individuals (CSFII). Thousands of U.S. residents were interviewed over a period of four years. Detailed food-consumption and demographic data were obtained, enabling researchers to not only determine the extent of the fruit and vegetable consumption gap, but also to describe the gap in terms of age, income, education, etc.

Although no comparable survey exists in the 2000s, in other surveys the federal government has included questions on dietary behavior that have generated interesting data about food consumption that researchers can use to examine and draw conclusions about dietary patterns. In general, analyses of those data show that many Americans are not consuming sufficient amounts of fruits and vegetables. For example, a study that relied on BRFSS data concluded that "the frequency of fruit and vegetable consumption changed little from 1994 through 2005 . . . and, if consumption is to be increased, we must identify and disseminate promising individual and environmental strategies, including policy change." [2] A 2009 study, using data from the National Health and Nutrition Examination Study (NHANES), found that only 0.9% of adolescents, 2.2% of adult men, and 3.5% of adult women met their Dietary Guidelines' calorie-specific recommendations for both fruits and vegetables.[3] A more recent analysis, using data from the 2009 Behavioral Risk Factor Surveillance System (BRFSS), found that only 32.5% of adults ate fruit two or more times daily and only 26.3% ate vegetables three or more times a day.[4]

Fruits and vegetables need to have a bigger role in Americans' diets. We are going to be looking at all kinds of ways to make that happen.

–DEPUTY SECRETARY OF AGRICULTURE, KATHLEEN MERRIGAN, IN "A CONVERSATION WITH KATHLEEN MERRIGAN," AMERICAN FARM BUREAU FEDERATION'S FOODIE NEWS BLOG, JULY 30, 2009

In the absence of comprehensive survey results, this report used aggregate consumption data for individual food products gathered by USDA in 2008 to derive the amount of fruits and vegetables consumed by the average U.S. resident. The Dietary Guidelines provided recommended consumption levels of fruits and vegetables for various levels of caloric intake (e.g., 2200). Once actual per capita consumption of fruits and vegetables was known, it was compared with the recommended consumption for the appropriate (i.e., average) caloric intake level.

To determine recommended levels of fruits and vegetables for the average U.S. resident, whose caloric intake would likely fall between those 200-calorie increments, we obtained the average U.S. caloric intake—2157—from 2005-06 NHANES data.[5] From that caloric intake level and the recommendations for 2000 and 2200 calorie diets, we derived the fruit and vegetable consumption recommendations for the average American reported in Table 1.

Table 1. Recommended Servings of Fruits and Vegetables[6]

	Recommended for 2000 Calories	Recommended for 2157 Calories	Recommended for 2200 Calories
Fruits	4	4	4
Vegetables	5	5.8	6

Data on per capita fruit and vegetable consumption was obtained from USDA's interactive loss-adjusted food availability website. The site enables users to obtain per capita consumption data for individual foods from a time series spanning the 1970 to 2008 period.[7] Consumption data reported in ounces per day on the USDA website were converted to servings per day for this report.

For purposes of this report, the extent to which the recommended amounts of fruits and vegetables for the average American exceeded actual per capita intake was defined as the nation's fruit and vegetable consumption gap. In Table 2 below, the overall fruit and vegetable gap for 2008 was constructed through a comparison, for the average U.S. consumer, of actual consumption of fruits and vegetables and the recommended levels in the Dietary Guidelines. From the data in the table, the extent of the American fruit and vegetable consumption gap in the year 2008 can be described in the following ways:

- The average U.S. resident consumed only 42.5% of the recommended amount of fruit per day and only 56.9% of the recommended daily intake of vegetables;
- To close the consumption gap, the average U.S. resident would have to eat 135% more fruit and 76% more vegetables;
- On average, consumption of fruits and vegetables, taken together, fell 4.8 (or 51%) servings short of the recommended combined total of 9.8 servings; and
- To reach recommended levels, fruit and vegetable consumption would have to increase by 96%.

These results, on their own, should add to the urgency for federal action to address the nation's fruit and vegetable consumption gap.

Table 2. The Current Overall Fruit and Vegetable Consumption Gap, 2008

	Recommended Average No. of Servings	Actual Average No. of Servings Consumed, 2008	Gap between Recommended and Actual Servings	% Increase in Servings Needed to Close Gap
Fruits	4	1.7	2.3	135
Vegetables	5.8	3.3	2.5	76

Much of the overall vegetable consumption gap reported in Table 2 reflects gaps in two vegetable categories that are particularly important from a nutritional perspective. Consumption of both dark green and orange vegetables falls far short of recommended levels, as shown in Tables 3 and 4. Together, they account for 45% (1.12 servings) of the overall vegetable consumption gap. As the Dietary Guidelines make clear through specific recommendations for sub-groups of vegetables, the analysis of vegetable consumption needs to look at more than the aggregate amount of vegetables consumed.

Table 3. Consumption Gap for Dark Green Vegetables, 2008

Recommended Servings per Week	Actual Servings per Week	Recommended Average Servings per Day	Actual Servings per Day	Consumption Gap	% Increase in Servings Needed to Close Gap
6	1.73	0.86	0.25	0.61	247%

Table 4. Consumption Gap for Orange Vegetables, 2008

Recommended Servings per Week	Actual Servings per Week	Recommended Average Servings per Day	Actual Servings per Day	Consumption Gap	% Increase in Servings Needed to Close Gap
4	0.35	0.57	0.05	0.52	1040%

A deeper examination reveals that not all of the country's vegetable consumption challenge can be captured in terms of consumption shortfalls. In one major food category, starchy vegetables, actual consumption exceeds the recommended intake level.[8] For the daily caloric intake of the average American, the Dietary Guidelines call for 6 cups, or the equivalent of 12 servings, of starchy vegetables a week (i.e., 1.71 servings a day). Actual consumption exceeded that level by 0.15 servings.

The fact that starchy vegetable consumption exceeds recommended levels may not be all good news for the American diet.[9] Of the 1.86 servings of starchy vegetables consumed a day by the average U.S. resident, 0.69 servings or 36.8% of that total is in the form of fried potatoes and potato chips. That means that 21% of the average daily intake of 3.34 servings of vegetables is comprised of fried potatoes and potato chips. In

and of itself, this might not be a serious problem, provided that the fat consumed in the fries and chips is part of a balanced diet that limits the percentage of calories from fat to the levels recommended in the Dietary Guidelines, and if Americans are eating the recommended levels of other types of vegetables. This over-consumption of starchy vegetables, however, does raise questions about the quality of starchy vegetable consumption, especially since the recommended intake for this sub-group of vegetables is being exceeded.

Changes in the Fruit and Vegetable Consumption Gap over Time

USDA's series of food availability data enables researchers to make more consistent comparisons of fruit and vegetable consumption from one time period to the next than would be possible if researchers had to compare results from differently constructed surveys conducted over time or compare survey data in one period with food availability data from another.

From 1989 to 1998, according to USDA food availability data, per capita fruit consumption increased by an annual average of 0.3% per year. Per capita vegetable consumption increased at a rate of 0.7% per year. Although these rates were much too slow to close the consumption gap, they were nonetheless positive. As Table 5 illustrates, per capita fruit and vegetable consumption did not increase.

Table 5. Changes in Per Capita Fruit and Vegetable Consumption, 1999-2008[10]

	1999 Actual Servings	2008 Actual Servings	% Change in Ten Years
Fruits	1.84	1.66	-9.8%
Vegetables	3.60	3.34	-7.2%

Conclusion: It's Time to Change Federal Priorities

In this first section of the report, the analysis of current fruit and vegetable consumption and changes in consumption over the past twenty years paints a picture of a nation falling far short of widely accepted dietary recommendations and failing to close the gap. Specific findings include the following:

- A large gap between actual and recommended consumption of both fruits and vegetables exists, despite decades of public concern and publicity about the connection between the incidence of chronic diseases and inadequate diet.
- The vegetable consumption gap reflects a double shortfall, since both overall consumption and consumption of nutritionally important types of vegetables fall well short of recommended levels.
- When the quality of current consumption is considered, the vegetable gap looms even larger.
- Fruit and vegetable consumption did not increase through most of the previous decade.

These results, on their own, should add to the urgency for federal action to address the nation's fruit and vegetable consumption gap. They demonstrate that the mix of market forces and existing federal policies that have been in place since the turn of the century are not likely to adequately address the country's fruit and vegetable gap any time soon.

In the next section, an examination of the economic costs of (and potential benefits of closing) the consumption gap provides another piece of the equation needed to understand the relationship between the fruit and vegetable consumption gap and federal food, agriculture, and public health policy priorities.

II. The Escalating Cost of Diet-Related Diseases

Introduction: The Relationship between Inadequate Diet and Premature Death

While scientists and other medical experts may disagree about the extent to which diet and intake of specific foods affect public health and life spans, the relationship between diet and health is firmly established as a cornerstone concept in the nation's public health system. Decades of studies and literature reviews conducted by public health experts have provided evidence of an important connection between the public's health and its eating patterns. Although the strength of the relationships between diet and chronic diseases across studies can vary substantially, the conventional wisdom within the public health community, which is reflected in the Dietary Guidelines, is that the evidence is strong enough, and the potential outcomes, such as heart attacks, strokes, cancer, and diabetes, are dangerous enough to warrant serious precautionary action.

The impact of diet-related diseases is a "silent crisis" that needs focus and attention. . .We have an opportunity in 2010 to commit ourselves to a healthier and more prosperous America.

–KATHLEEN SEBELIUS, U.S. SECRETARY OF HEALTH AND HUMAN SERVICES, AT THE USDA/HHS NUTRITION SUMMIT, MAY 2010

The adverse health outcomes associated with diet-related diseases also have serious economic implications for American families, the health care system, businesses, and the federal government. The purpose of this section of the report is to shed light on the current diet-related costs to the nation, with a particular focus on costs created by inadequate fruit and vegetable consumption.

The analysis builds on the seminal 1999 study of the economic costs of diet-related chronic diseases in the U.S. by USDA researcher, Elizabeth Frazao. In the study, Frazao targeted four major diet-related chronic diseases—cardiovascular heart disease, stroke, cancer, and diabetes—and, using estimates of the percent reduction in incidence derived from the scientific literature, determined the percentage of total economic costs of the four diseases that could be attributed to dietary patterns.[11, 12]

A subsequent review of the literature by the author of the current report revealed additional evidence of the impact of dietary factors on the incidence of these chronic illnesses. Examples of studies and statements in the literature included the following:[13]

- In 1993, for example, a study reported in the *Journal of the American Medical Association* found that inadequate diet and physical activity were the leading combined cause of premature death in the U.S. The 310,000 to 580,000 annual deaths caused by those factors outranked even tobacco by 50,000 to 110,000 deaths.[14] A 2009 study, commissioned by the CDC, isolated the factors related to food consumption and attributed up to 384,000 deaths to dietary causes.[15]

- According to a recent American Cancer Society report, "It's been estimated that approximately one-third of the cancer deaths that occur in the U.S. each year are due to poor nutrition and physical inactivity, including excess weight. Eating a healthy diet, being physically active on a regular basis, and maintaining a healthy body weight, are as important as not using tobacco products in reducing cancer risk."[16]
- Authors of a comprehensive World Health Organization report on diet and health stated that "dietary factors are estimated to account for approximately 30% of cancers in industrialized countries, making diet second only to tobacco as a theoretically preventable cause of cancer."[17]
- The Diabetes Prevention Program Outcomes Study found that "lifestyle intervention reduced the risk of developing diabetes by 58% over a 3-year period." A healthier diet was one of the major lifestyle factors, including increased consumption of fruits and vegetables.[18]
- In a fourteen-year study of nearly 86,000 women, Harvard School of Public Health researchers estimated that dietary improvements reduced the incidence of coronary disease by 16 percent.[19]

The authors of the *2005 Dietary Guidelines for Americans* summed it up this way in the opening chapter of their report:

> *The Dietary Guidelines for Americans provides science-based advice to promote health and to reduce risk for major chronic diseases through diet and physical activity. Major causes of morbidity and mortality in the United States are related to poor diet and a sedentary lifestyle. Some specific diseases linked to poor diet and physical inactivity include cardiovascular disease, type 2 diabetes, hypertension, osteoporosis, and certain cancers. Furthermore, poor diet and physical inactivity, resulting in an energy imbalance (more calories*

consumed than expended), are the most important factors contributing to the increase in overweight and obesity in this country. Combined with physical activity, following a diet that does not provide excess calories according to the recommendations in this document should enhance the health of most individuals.[20]

The Burden of Inadequate Diet on the Health Care System and the Economy

1. Current Health Care and Other Costs

Table 6 below reports the costs to the health care system and the total economic costs associated with four major diseases for which an inadequate diet is an important risk factor. Total economic costs represent the sum of: direct medical costs; costs associated with loss of productivity (e.g., days lost from work); and estimates of the cost of premature loss of life (e.g., lost income due to a shorter life span). The estimates are drawn from major nonprofit public health associations. As Table 6 illustrates, the costs of these diseases are enormous and put an enormous burden on the nation's health care system. Medical costs account for 54.1% of the total economic costs of these diseases.

Table 6. Costs of Selected Diet-Related Diseases, 2007-09[21]

	Direct Medical Costs	All Economic Costs
Diabetes	$116,000,000,000	$174,000,000,000
Cancer	$93,200,000,000	$228,100,000,000
Coronary Heart Disease	$96,000,000,000	$177,100,000,000
Stroke	$48,000,000,000	$73,700,000,000
Total	$353,200,000,000	$652,900,000,000

Not all of these costs, however, can be attributed to inadequate diet since heredity and environmental factors, smoking, alcohol intake, and exposure to pollutants, have an impact on disease incidence as well. To isolate the costs associated with diet, following Frazao's approach, we multiplied the costs in Table 6 by estimates of the degree to which the risk of those diseases is affected by inadequate diet. The results, using Frazao's multipliers, are reported in Table 7.[22] For the four diseases, dietary factors account for nearly $150 billion a year in economic costs to U.S. society. On average, diet-related costs comprise 21.8% of the total economic costs of those diseases.

Table 7. Diet-Related Costs of Chronic Illnesses, 2007-09

	Direct Medical Costs	All Economic Costs
Diabetes	$15,700,000,000	$23,500,000,000
Cancer	$28,000,000,000	$68,400,000,000
Coronary Heart Disease	$19,200,000,000	$35,400,000,000
Stroke	$9,600,000,000	$14,700,000,000
Total	$72,500,000,000	$142,000,000,000

2. Changes in Costs over Time

Table 8 presents estimates of the diet-related economic costs of the four chronic illnesses in 1999. A comparison of the results for 2007-2009 in Table 7 and 1999 in Table 8 indicates that over roughly ten years the diet-related costs of the four chronic diseases analyzed in this report skyrocketed. In particular, that comparison shows that:

- Direct medical costs within the health care system of the four diet-related diseases increased by 91%; and
- Total economic costs of those diet-related diseases increased by 74%.

The enormous jump in diet-related costs offers a sobering reminder that business-as-usual spending from decade to decade will not begin to address the diet-related disease issues confronting American society.

While these results are eye-opening, they are likely to come as little surprise. The baby boomers are moving through middle age; cost increases for health care services and health insurance have far outpaced the nation's overall rate of inflation; the prevalence of these chronic diseases has increased; and average dietary patterns, as evidenced by the growing fruit and vegetable consumption gap, have not changed significantly.

Table 8. Diet-Related Costs of Chronic Illnesses, 1999[23]

	Direct Medical Costs	All Economic Costs
Diabetes	$7,800,000,000	$14,100,000,000
Cancer	$17,300,000,000	$43,400,000,000
Coronary Heart Disease	$7,700,000,000	$16,000,000,000
Stroke	$5,200,000,000	$8,100,000,000
Total	$38,000,000,000	$81,600,000,000

The Impact of Fruits and Vegetables on the Cost of Chronic Diseases

As suggested by the preeminent place assigned to fruits and vegetables in the Dietary Guidelines, those foods have an important role to play in reducing the incidence of diet-related chronic diseases. A 2002 report on fruit and vegetable consumption by the U.S. General Accountability Office (GAO) summarized the literature on the health benefits of fruits and vegetables.[24] Some of the key observations in that summary included the following:[25]

- According to an NIH report, diets high in fruits and vegetables are associated with a 20 to 40 percent reduction in the occurrence of coronary heart disease.
- A recent report comparing data from women in the Nurses' Health Study with men in the Health Professionals' Follow-Up Study showed that men who ate an average of 10 servings and women who ate an average of 9 servings per day of fruits and vegetables had a 20-percent lower risk of coronary heart disease than men and women who ate an average of 2.5 to 3 servings a day.
- People who consume 5 or more servings of fruits and vegetables daily have about one-half the cancer risk of those who consume 2 or fewer servings, according to an NIH report. Although there are still many unresolved questions regarding the association between cancer risk and the consumption of fruits and vegetables, ample scientific evidence indicates that frequent consumption of a variety of fruits and vegetables protects against some cancers, particularly cancers of the mouth, pharynx, esophagus, stomach, colon, and rectum. The evidence also suggests reductions in the risk for cancers of the breast, pancreas, larynx, and bladder.
- A recent analysis of 14 years of data from the Nurses' Health Study and 8 years of data from the Health Professionals' Follow-Up Study disclosed that each additional daily serving of fruits or vegetables was associated with a 4 to 7 percent reduction in the risk of stroke.
- An analysis of 20-year follow-up data from nearly 10,000 men and women who participated in a 1970's study showed that individuals who developed diabetes had a lower average consumption of fruits and vegetables. Specifically, the study found an association between consuming 5 or more servings of fruits and vegetables daily and a lower incidence of diabetes. Furthermore, women who consumed 5 or more servings of fruits and vegetables per day were 39 percent less likely to develop diabetes compared with women who consumed little or no fruits and vegetables.

A cost analysis of inadequate fruit and vegetable consumption can be performed, using a similar methodology to the one used to generate outcomes in Tables 7 and 8. As illustrated in the summary of the literature in the GAO study, some studies report detailed relationships between fruit and vegetable servings and reductions in the risk of chronic illnesses. Those relationships can be used to develop working estimates of the risk reduction that would be achieved if the fruit and vegetable consumption gap (i.e., 4.8 daily servings) were closed. In turn, the risk-reduction estimates can be used as multipliers to determine what portion of the economic costs in Table 7 can be attributed to inadequate fruit and vegetable consumption.

Although there is a strong body of literature supporting the conclusion that fruits and vegetables contribute to the reduction of risk for many cancers, a recent, high-profile study has suggested that the overall relationship between diet and cancer may not be as strong as previously thought.[26] The report found that for every two servings of fruits and vegetables consumed daily, the risk of cancer is reduced by 2.5%. To account for this new information, a risk coefficient of 6% was chosen for use in this analysis to capture the impact of closing the 4.8-serving fruit and vegetable gap. (This is much lower than the coefficient based on the NIH estimates cited in the 2002 GAO report.)[27]

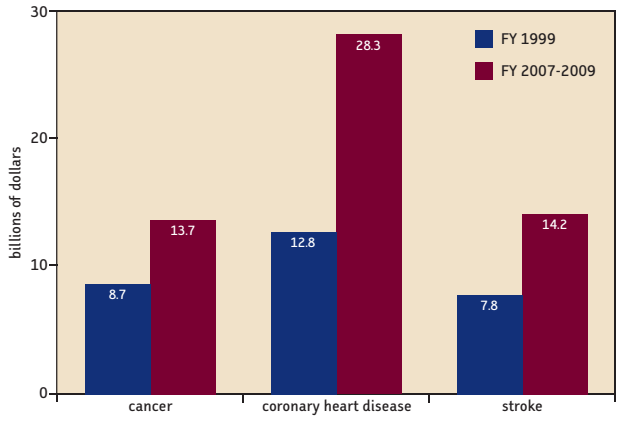
The analysis of the 2007-2009 data is reported in Table 9.[28] As the table shows, the economic costs of the fruit and vegetable consumption gap for the three chronic diseases are substantial, exceeding $56 billion a year. The size of the economic burden suggests that:

- Current low fruit and vegetable consumption is a high-risk, high-cost reality that warrants high priority within the nation's food and agricultural policy agenda;
- Multi-billion-dollar federal investments in closing the fruit and vegetable consumption gap would generate highly positive benefit-cost ratios.

Table 9. Economic Costs of the Fruit and Vegetable Consumption Gap, 2007-09

	Direct Medical Costs	All Economic Costs
Cancer	$5,600,000,000	$13,700,000,000
Coronary Heart Disease	$15,400,000,000	$28,300,000,000
Stroke	$9,300,000,000	$14,200,000,000
Total	$30,300,000,000	$56,200,000,000

Figure 1. Economic Costs of the Fruit & Vegetable Consumption Gap



To understand how these costs have changed over time, we applied the fruit and vegetable risk coefficients to the medical costs and total economic cost findings for the year 1999 presented in Table 8. The findings are reported in Table 10. As with total diet-related costs, the costs of inadequate fruit and vegetable consumption have grown rapidly since the late-1990s, as shown in Figure 1. Total economic costs attributable to inadequate fruit and vegetable consumption have grown 92% or roughly 9% per year. The rapid growth of the health-related costs of the fruit and vegetable consumption gap puts tremendous pressure on public investment to keep up with those economic impacts.

Table 10. Economic Costs of the Fruit and Vegetable Consumption Gap, 1999

	Direct Medical Costs	All Economic Costs
Cancer	$3,500,000,000	$8,700,000,000
Coronary Heart Disease	$6,200,000,000	$12,800,000,000
Stroke	$5,000,000,000	$7,800,000,000
Total	$14,600,000,000	$29,300,000,000

III. The Disconnect Between USDA Spending Priorities and Public Health Goals

Introduction

As indicated by quotes in this report thus far, high-level federal officials have expressed great concern about the nation's diet-related health problems, recognized the perils of the fruit and vegetable consumption gap, and made commitments to using the resources at their disposal to help close the gap. In particular, the Secretary of Agriculture, to his credit, has been saying all of the right things.

In this section of the report, we examine the relationship between USDA spending patterns to determine whether the stated commitment to diet and health and closing the consumption gap is reflected in the federal government's spending priorities.

Overall Methodology for the Analysis of USDA Spending

We expand the analysis beyond fruits and vegetables to include the four other major food groups found in the recommendations of the 2005 Dietary Guidelines, including grains, the meat category (i.e., beef, pork, poultry, fish, and nut products), dairy products, and fats and oils. The intent of the analysis is to determine the extent to which the allocation of USDA spending among those major groups coincides with the nation's diet and health priorities as expressed in the *2005 Dietary Guidelines for Americans*. Particular attention is focused on the share of spending devoted to fruits and vegetables.

USDA spending provides a transparent window into the priorities of that department and relevant agencies within it. In the final analysis, when ten or more billions of dollars are at stake, money talks and provides a robust indicator of federal food and agriculture priorities. As a proxy for the nation's public health priorities, we used the allocation of daily food servings among the major food groups in the Dietary Guidelines. We assumed that the more closely the allocation of USDA resources matches the distribution of servings, the more USDA's priorities are likely to be synchronized with the diet and health mandate reflected in the Dietary Guidelines. If a specific food group accounts for a large proportion of the total recommended servings in the daily diet and consumption of that food group falls far short of recommended levels, then federal spending associated with that food group should also account for a relatively high percentage of total spending for all the food groups.

It is clear, from what President Obama has indicated to me, that he wants this department to promote nutrition through the use of healthy fruits and vegetables.

–SECRETARY OF AGRICULTURE, TOM VILSAK, AT HIS FIRST PRESS CONFERENCE, QUOTED IN FOOD AND FIBER LETTER, FEBRUARY 2, 2009.

To determine the share of total daily recommended servings for each of the major food groups, we extended the analysis in Table 1 to the Dietary Guideline recommendations for food grains, products in the meat category, dairy products, and fats and oils. Once the number of recommended servings were established for each food group's mean caloric intake, they were converted into percentage shares of the total number of daily servings.

Using federal government spending data for FY 2008 and FY 2009, spreadsheets were developed for USDA spending on numerous types of food groups.[29] These included, but were not limited to: direct payment commodity program subsidies; crop insurance premium subsidies; commodity-based disaster and emergency programs; food and agricultural research; food purchases for nutrition assistance programs; and administrative expenses for commodity-specific programs (e.g., the grazing management program of the Forest Service, the grain and livestock programs of the Grains, Packers and Stockyards Administration, and the dairy program of the Agricultural Marketing Service). Spending categories were included if they were determined to directly or indirectly support, subsidize, or promote the production and domestic consumption of those food groups.

Spending data for commodity-program subsidies were adjusted to account for the fact that substantial portions of grain and oilseed crops were removed from domestic consumption via export markets and were also converted to multiple domestic uses. After removing export volume for corn, for example, the remaining corn subsidy had to be divided, based largely on USDA supply and disappearance data, among food grain, feed grain, oil, and sweetener uses. The proportion of corn subsidies assigned to domestic feed grain use was counted as spending dedicated to the promotion of the meat food group. Similar computations were performed to allocate research dollars from grain and oilseed crops to the meat food group.

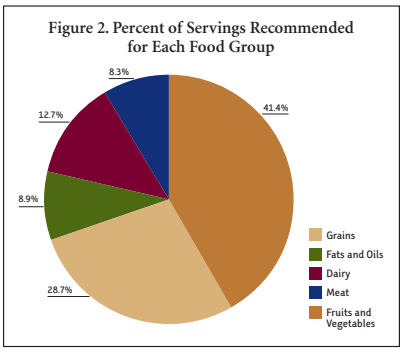
Major Findings About USDA Spending Priorities

1. Priority of Food Groups in the Dietary Guidelines

Table 11 shows the recommended number of daily servings for each of the six major food groups and Figure 2 shows the percentage of the total servings accounted for by each group. Fruits and vegetables comprise 41.4% of total servings, which is the highest percentage of any food group. Meat group products account for only 8.3%, the lowest share of any food group in the table. For federal spending priorities to be consistent with Dietary Guideline food-consumption priorities, fruits and vegetables would have to comprise more than a third of USDA spending while meat would have to account for roughly ten percent of total spending.

Table 11. Recommended Number of Servings for Various Caloric Intake Levels

Food Group	2000	2157	2200
Grains	6	6.79	7
Meat	1.83	1.96	2
Dairy	3	3	3
Fats and Oils	1.98	2.10	2.13
Fruits	4	4.00	4
Vegetables	5	5.79	6



For the purposes of this analysis, USDA promotional spending on food groups was divided into four major categories: 1) commodity subsidies; 2) food and agricultural research; 3) purchases for nutrition assistance programs; and 4) administrative expenses dedicated to specific food groups. Each of the next four tables reports spending amounts for these categories and compares the percentage share of spending for each food group with each food group's share of the Dietary Guidelines' recommended servings in Table 11 and Figure 2.

2. Farm Bill Food Group Subsidies

Table 12 presents data on levels of mandatory spending authorized in the 2008 Farm Bill. For food and feed grains, spending includes direct payments to farms, crop insurance premium subsidies, and other farm bill subsidies. Meat group subsidies include indirect subsidies from federal support of feed-grain and oilseed producers and a number of direct emergency and disaster aid programs. Fruit and vegetable subsidies include: crop insurance premium subsidies, the fresh fruit and vegetable programs associated with the nutrition assistance programs, and farmers' market promotion programs. Dairy subsidies include federal dairy program outlays managed through the Farm Service Agency and indirect subsidies from federal payments to feed grain and oilseed farmers. Subsidies for fats and oils include direct payments to oilseed growers and a share of dairy program support allocated to milk used to produce butter.

Table 12. USDA Average Annual Spending on Commodity Subsidies, 2008-09

Food Group	Spending	% Share of Spending	% Share of Recommended Servings
Grains	$1,519,663,000	18.0%	28.7%
Meat	$4,618,501,000	54.7%	8.3%
Dairy (non-butter)	$961,597,000	11.4%	12.7%
Fats and Oils	$521,522,000	6.2%	8.9%
Fruits and Vegetables	$825,406,000	9.8%	41.4%

The findings in Table 12 are particularly critical. These subsidies comprise 49% of the total food group spending by USDA. Since fruits and vegetables are allocated less than 10% of the funding for these subsidies, about three-quarters (72%) of the remaining food group spending for the other subsidies would have to be re-allocated to fruits and vegetables to ensure that their share of total food group spending matches their share (41.4%) of recommended servings.

The meat group, despite having the lowest share of recommended servings, captured nearly 60% of commodity subsidy spending or nearly triple the share of the next highest recipient, the grain group. Shares of spending align relatively well with shares of servings only for the dairy and the fats and oils food groups.

3. USDA Research Spending

Spending data for FY 2008, the latest year for which federal data was available, were obtained from USDA's CRIS research reporting system and are shown in Table 13.[30] The share of total food group research spending allocated to fruits and vegetables, while closer to the share of servings recommended in the Dietary Guidelines than other USDA spending indicators, still falls 42% short of that standard. Food group research spending accounts for only 18% of total USDA food group spending.

Table 13. USDA Spending on Food and Agricultural Research, 2008

Food Group	Spending	% Share of Spending	% Share of Recommended Servings
Grains	$171,626,000	8.6%	28.7%
Meat	$1,075,560,000	53.6%	8.3%
Dairy (non-butter)	$205,017,000	10.2%	12.7%
Fats and Oils	$70,513,000	3.5%	8.9%
Fruits and Vegetables	$483,567,000	24.1%	41.4%

The meat group receives the lion's share of food group research spending. Dairy research spending is closely aligned with that food group's share of servings. However, the grain group, another heavily weighted food group in the Dietary Guidelines, does not fare well in this arena.

4. USDA Nutrition Assistance Programs

USDA spending for federal nutrition assistance programs that targets low-income families is reported in Table 14. In this report, we examined USDA food purchases for programs such as the National School Lunch Program, the National School Breakfast Program, the Special Milk Program, and consumer subsidies provided through the Special Supplemental Nutrition Program for Women, Infants and Children (WIC).[31] As data in Table 14 indicate, unlike previous tables, the proportion of total spending allocated to fruits and vegetables is close to that food group's proportion of recommended servings in the Dietary Guidelines. The proportion of spending for fruits and vegetables in nutrition assistance programs was relatively consistent across direct food purchases by USDA (37.5%) and WIC spending (35.2%). WIC accounted for $1.47 billion (74%) of the $1.99 billion of nutrition assistance program spending on fruits and vegetables.

To compute WIC spending, we used USDA's estimates of WIC participants' prescribed spending for specific food products (e.g., juice, milk, cheese, bread, peanut butter) and the value of vouchers for fruit and vegetable purchases in documents accompanying USDA's interim rule for revisions of WIC food packages. Those FY 2007 cost estimates were adjusted upward, to reflect actual changes in food prices and participant levels between then and FY 2009.[32]

Table 14. USDA Food Group Spending on Nutrition Assistance Programs, 2008-2009

Food Group	Spending	% Share of Spending	% Share of Recommended Servings
Grains	$906,675,000	16.4%	28.7%
Meat	$1,126,990,000	20.4%	8.3%
Dairy (non-butter)	$1,501,283,000	27.1%	12.7%
Fats and Oils	$10,373,000	0.2%	8.9%
Fruits and Vegetables	$1,989,870,000	35.9%	41.4%

5. Program Administration Spending by Food Group

Table 15 documents spending for specific food group programs within USDA agencies that have budget line items. The sole fruit and vegetable program in this table is run by the Agricultural Marketing Service (AMS). Spending for the meat food group includes the Packers and Stockyards Administration, AMS' meat, poultry and egg programs, a portion of the commodity and income support administrative costs of the Farm Service Agency (FSA) which manages crop subsidy programs, and the U.S. Forest Service's grazing management program. The dairy group is represented by the AMS' dairy program and a share of the FSA's income support and commodity program expenses. The oilseed group also accounts for a share of FSA program costs.

Under this spending category, the share of spending for fruits and vegetables falls far short of their share of recommended servings. The meat group again dominates spending while the other food groups receive shares of spending that are relatively consistent with their shares of recommended servings.

Table 15. USDA Average Annual Agency Commodity Administrative Costs, 2008-09

Food Group	Spending	% Share of Spending	% Share of Recommended Servings
Grains	$169,844,000	18.0%	28.7%
Meat[33]	$564,252,000	59.9%	8.3%
Dairy (non-butter)	$89,153,500	9.5%	12.7%
Fats and Oils	$59,367,000	6.3%	8.9%
Fruits and Vegetables	$59,000,000	6.3%	41.4%

It would take more than a doubling in total spending for fruits and vegetables to $7.01 billion (from $3.36 billion) to fully align USDA spending for those food groups with their prominence in the Dietary Guidelines.

6. Summary for All Food Group Spending

Table 16 summarizes the findings about USDA food group spending contained in Tables 12 through 15. Despite large amounts of spending for fruits and vegetables in the nutrition assistance programs, overall USDA spending related to fruits and vegetables remains unaligned with the proportion of total food servings allocated to fruits and vegetables by the *2005 U.S. Dietary Guidelines for Americans*. That shortfall is illuminated in Table 17, which shows the proportion of USDA spending allocated to fruits and vegetables other than in nutrition assistance programs.

From Tables 12 through 17, the following conclusions can be drawn about USDA spending priorities with respect to major food groups:

- Overall, the share of spending captured by fruits and vegetables is substantially out of synch with Dietary Guideline priorities, since its share of spending (19.8%) remains less than half of its share of recommended servings (41.4%).
- It would take more than a doubling in total spending for fruits and vegetables to $7.01 billion (from $3.36 billion) to fully align USDA spending for those food groups with their prominence in the Dietary Guidelines.

Table 16. Combined USDA Spending by Food Group, 2008-09[34]

Food Group	Spending	% Share of Spending	% Share of Recommended Servings
Grains	$2,767,807,000	16.3%	28.7%
Meat	$7,385,303,000	43.6%	8.3%
Dairy (non-butter)	$2,757,051,000	16.3%	12.7%
Fats and Oils	$ 661,775,000	3.9%	8.9%
Fruits and Vegetables	$3,357,843,000	19.8%	41.4%

Figure 3. Total USDA Spending by Food Group vs. Daily Recommended Servings, 2008-2009

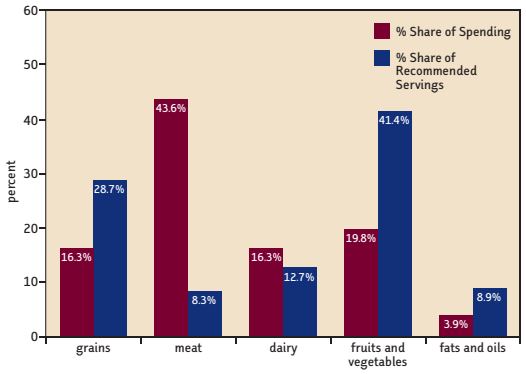
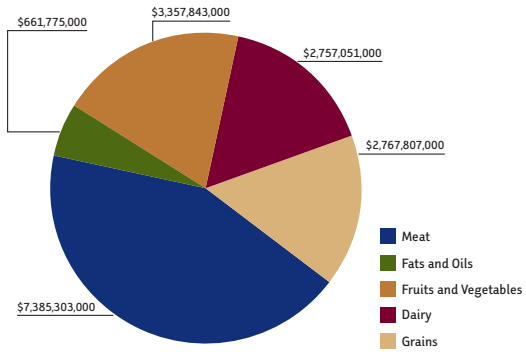


Figure 4. USDA Spending by Food Group, 2008-2009



- When viewed in the context of the Dietary Guideline recommendations, USDA's spending gap equals $3.65 billion. In other words, USDA would have had to reallocate $3.65 billion of its annual spending to fruits and vegetables to ensure that its fruit and vegetable spending priorities were synchronized with Dietary Guideline priorities. That's only 4% of total USDA spending in FY 2008.
- Since just over half of USDA's food group related spending is found in farm bill mandated subsidies, a reallocation of farm bill spending would be the most obvious source of the $3.65 billion needed to close the fruit and vegetable spending gap.
- The $3.65 billion needed to align USDA's spending for fruits and vegetables with the Dietary Guidelines is only about 7% of the total economic cost for diseases associated with inadequate fruit and vegetable consumption (see Table 9). Achieving that level of annual spending would result in a very strong benefit-cost ratio of more than 15 to 1.
- When nutrition assistance programs are eliminated from the analysis, as in Table 17, the share of spending allocated to fruits and vegetables shrinks from nearly 20% to 12%. This finding illustrates that although USDA spending on fruits and vegetables is close to being aligned with the Dietary Guidelines for some of its programs benefiting low-income Americans, spending throughout the rest of USDA's food group portfolio has a long way to go to meet that standard.[35]

Table 17. USDA Spending by Food Group Other Than for Nutrition Assistance, 2008-09

Food Group	Spending	% Share of Spending	% Share of Recommended Servings
Grains	$1,861,133,000	16.3%	28.7%
Meat	$6,258,313,000	54.9%	8.3%
Dairy (non-butter)	$1,255,768,000	11.0%	12.7%
Fats and Oils	$651,402,000	5.7%	8.9%
Fruits and Vegetables	$1,367,973,000	12.0%	41.4%

- Another clear indicator of the inconsistency between USDA spending and Dietary Guideline priorities is the dominant share of USDA spending dedicated to the meat group. As Table 16 indicates, the meat group's share of USDA food group spending was more than five times its share of servings under the Dietary Guidelines. As a result, spending for neither food grains nor fruits and vegetables, which are the two most recommended food groups, came close to their shares of Dietary Guideline servings.
- The meat group's share was both very high and very consistent across the three non-nutrition assistance spending categories, varying within a narrow range from 53.6% and 59.9% of spending within those three spending categories, despite its low (8.3%) share of recommended food servings. When nutrition assistance programs are eliminated from the analysis, the share of USDA spending for the meat group surges from 44% to 55%.

Table 18. Summary of USDA Fruit and Vegetable Spending, 2008-09

	Spending	% of USDA Spending on Fruits and Vegetables
Commodity Subsidies	$825,406,000	24.6%
USDA Research	$483,567,000	14.4%
Nutrition Assistance Programs	$1,989,870,000	59.3%
Administrative Expenses	$59,000,000	1.8%
Total Fruit & Vegetable Specific Spending	$3,357,843,000	100.0%

Figure 5. Summary of USDA Fruit & Vegetable Spending, 2008-2009

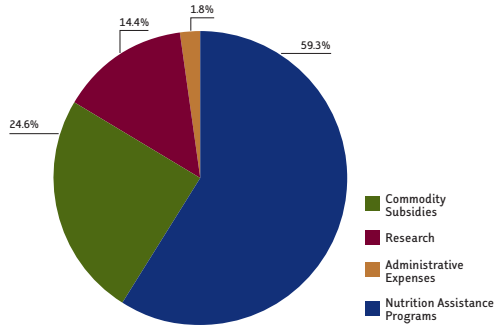


Figure 5 summarizes USDA food group specific spending on fruits and vegetables. As discussed above, nutrition assistance programs account for about 60% of USDA's spending related to fruits and vegetables. WIC program spending alone accounts for 44% of USDA spending on this food group.

IV. The Gap in USDA Funding for Nutrition Education Programs

Introduction to the Federal Nutrition Education Landscape

The federal government, in recognition of the need to promote healthier diets, has, for decades, developed and implemented nutrition education programs. Most, but not all, of those programs are administered in conjunction with federal nutrition assistance programs. HHS, through the CDC's Division of Nutrition, Physical Activity and Obesity (DNPAO) program, also administers initiatives that support state-level public outreach programs and the national Fruits & Veggies—More Matters program, which used to be known as 5 A Day.

In addition to the DNPAO program, five USDA programs, administered through the Food and Nutrition Service (FNS), dominate the federal nutrition education landscape. These include:

- EFNEP, the Expanded Food and Nutrition Education program;
- FDPIR Nutrition Aides, the nutrition education program for the Food Distribution Program for Indian Reservations;
- SNAP-Ed, the nutrition education arm of the Supplemental Nutrition Assistance Program, formerly known as the Food Stamp Program;
- Team Nutrition, which is responsible for nutrition education efforts accompanying the school meals programs; and
- The WIC Nutrition Ed program, which provides nutrition education to women in the Special Supplemental Program for Women, Infants and Children (WIC).

Obesity and the health conditions that it causes are related in part to poor diets, including the under-consumption of fruits and vegetables. Children and youth are also not as physically active as experts recommend to prevent obesity and promote good health and this, too, contributes to the "energy balance" problem that leads to obesity. This is one reason why USDA is joining with First Lady Michelle Obama in aggressively promoting the Healthier US School Challenge, which recognizes schools that do an exceptional job promoting the meal participation, meal quality, nutrition education and physical activity.

–STATEMENT OF KEVIN CONCANNON, UNDER SECRETARY FOR FOOD, NUTRITION AND CONSUMER SERVICES, BEFORE THE HOUSE SUBCOMMITTEE ON AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION, AND RELATED AGENCIES, MARCH 4, 2010

EFNEP, according to the USDA's website, "is designed to assist limited-resource audiences in acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being."[36]

The ***SNAP-Ed*** program enables state SNAP agencies to provide, as part of their administrative operations, nutrition education for eligible individuals. SNAP-Ed State Plan Guidance encourages States to use effective nutrition education tools and strategies to promote good health and prevent or postpone the onset of diet-related chronic diseases.[37]

Team Nutrition provides training and technical assistance for foodservice, nutrition education for children and their caregivers, and school and community support for healthy eating and physical activity. This initiative delivers nutrition messages via classroom activities, school-wide events, home activities, community programs, and media events and coverage.[38]

The ***WIC Nutrition Education Program*** is available to all WIC participants. Local WIC agencies must offer no less than two nutrition education sessions every six months to participants. The program is designed to improve the health, dietary habits, and nutritional status of program participants.[39]

Nutrition Education Programs Continue in the Shadow of Other Federal Spending

Table 19 shows that nutrition education spending represents a very small percentage—only about one percent—of the amount spent on nutrition assistance programs. Given the size of the fruit and vegetable consumption gap—it's larger for low-income Americans than for the average U.S. resident—and the number of families reached by the nutrition assistance programs, the findings reported in Table 19 suggest an area of substantial under-spending that could be better utilized to enhance fruit and vegetable consumption.

Table 19. Nutrition Education for Nutrition Assistance Programs, FY 2008[40]

Program	Nutrition Education Spending	Food Assistance Program Spending	Nutrition Education as a % of Program Spending
FDPIR	$1,200,000	$96,400,000	1.2%
SNAP	$314,100,000	$37,642,000,000	0.8%
Team Nutrition	$13,300,000	$11,698,500,000	0.1%
WIC Nutrition Education	$358,000,000	$6,476,000,000	5.5%
Total	$686,600,000	$55,912,900,000	1.3%

The Federal Nutrition Education Investment Gap

Table 20, which focuses on nutrition education spending per participant for five Food and Nutrition Service assistance programs, reveals another aspect of the nutrition education spending gap. As the data indicate, spending per participant varies greatly across the various nutrition education programs. This variation has significant implications. Not all nutrition education programs have been equal in terms of their ability to increase fruit and vegetable intake. WIC and the SNAP program, for example, have historically been weak performers.[41]

The EFNEP program, on the other hand, has consistently produced the best results with respect to increases in fruit and vegetable consumption. For example, in FY 2008, EFNEP interventions generated average increases of 1.8 servings of fruits and vegetables.[42] In addition, a new study of the California WIC program indicates that more focused fruit and vegetable oriented interventions with WIC participants, designed to leverage the new regulations that provide WIC vouchers to purchase fruits and vegetables, are having a greater impact than previous multi-component interventions.[43] These results suggest that boosting nutrition education funding levels for the SNAP-Ed program to bring them in line with the intensity of the EFNEP program would warrant serious consideration.

The EFNEP program includes five topical areas. Two of these categories, or 40%, were considered nutrition education. Therefore, only 40% of spending per participant is reflected in Table 20.

Table 20. Spending on Nutrition Education per Participant, FY 2008

Program	Spending	Participants	Nutrition Education Dollars Per Participant
EFNEP	$66,000,000	518,000	$50.95[44]
FDPIR Nutrition Aide	$1,200,000	90,000	$13.33
SNAP-Ed	$314,100,000	28,400,000	$11.06
Team Nutrition (School Meals Programs)	$13,300,000	50,300,000	$0.26
WIC Nutrition Education	$358,000,000	8,700,000	$41.15

The percentage of NIH cancer, coronary heart disease, and stroke research funds that were devoted to fruits and vegetables continued to be minute, despite the significant health risks associated with the fruit and vegetable consumption gap. In both FY 2000 and FY 2008, the amount of each disease's funding that was spent on fruit and vegetable research was less than 1%.

V. Diet-Related Health Issues: A Low Priority at HHS

Introduction

The federal government's vast public health research and disease prevention establishment, housed at NIH and CDC, provides another revealing window to federal priorities regarding the nation's fruit and vegetable consumption gap. In this section, data from the NIH Reporter, the federal government's medical research database, and federal budget materials are used to determine the extent to which HHS spending on fruit and vegetable related projects reflects the Dietary Guideline recommendations for fruit and vegetable servings and the health risks associated with inadequate diet and low fruit and vegetable consumption. NIH has a critical role to play in the fruit and vegetable research system since it covers all of the critical public health bases, including disease causality, disease prevention, and promotion of consumption.

Indicators of Current Priorities

Figure 6. NIH Research Spending for Three Diet-Related Diseases, FY 2008

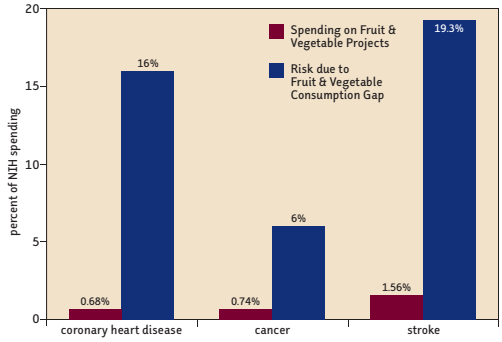


Table 21. NIH Research Spending for Three Diet-Related Diseases, FY 2008

	Total Spending for All Research Projects	Spending for Fruit and Vegetable Projects	% of Spending on Fruit and Vegetable Projects	% of Risk Due to Fruit and Vegetable Consumption Gap
Cancer	$5,570,000,000	$41,327,000	0.74%	6.0%
Coronary Heart Disease	$367,000,000	$2,482,000	0.68%	16.0%
Stroke	$296,000,000	$4,613,000	1.56%	19.3%
Total	$6,233,000,000	$48,422,000	0.78%	N/A

When NIH's fruit and vegetable related work is viewed in terms of numbers of projects, rather than spending, the results are very similar. As Table 21 indicates, the proportion of nutrition and diet-related disease projects associated with fruit and vegetable research also indicates that those foods are a far lower priority for NIH than would be suggested by their role in the Dietary Guidelines, their contribution to chronic disease risk, and the economic costs associated with the consumption gap. For the three diet-related diseases combined, less than one percent of those projects were related to fruits and vegetables, despite the fact that the fruit and vegetable consumption gap contributes between 6%-19% of the risk for those diseases.

Table 22 views NIH fruit and vegetable research from the perspective of the number and percentage of projects, rather than spending. The findings reported in the Table 22 confirm the conclusion that, for the three major chronic diseases, NIH investment in fruit and vegetable research in FY 2008 fell far short of the contribution that inadequate fruit and vegetable consumption plays in the risks for those diseases.

Table 22. Number of NIH Research Projects, FY 2008

	Total Number of Research Projects	Number of Projects Related to Fruits or Vegetables	% of Projects That Are Related to Fruits or Vegetables
Cancer	19,646	121	0.62%
Coronary Heart Disease	1,464	8	0.55%
Stroke	2,477	11	0.44%
Total	23,587	140	0.59%

VI. Trends in Federal Spending for Fruits and Vegetables

Introduction

The analyses in Sections III-V of this report focused on current levels of federal funds allocated toward fruits and vegetables. To put current resource allocations and priorities into historical perspective, this section compares them with allocations at the turn of this century. As shown in the first two sections of the report, over the last decade, three things happened that provide a backdrop for this historical analysis: 1) per capita fruit and vegetable consumption has not increased; 2) the number of servings of fruits and vegetables recommended in federal Dietary Guidelines has increased; and 3) the costs of chronic diseases associated with poor diet and inadequate fruit and vegetable consumption have soared.

Despite the fact that the current priority level given to fruits and vegetables fails to coincide with the prominence of fruits and vegetables in the Dietary Guidelines and the heavy costs of diet-related diseases, that level, though low, could represent a base on which to build future federal investments. This section attempts to determine whether or not that has been the case.

Overall USDA Food Group Spending

As shown in Table 23 and graphically in Figure 7, USDA fruit and vegetable spending increased significantly during the first decade of the 21st century. Spending grew by 154%, an average of about 15% per year, easily outpacing the rate of increase in the economic costs of insufficient fruit and vegetable consumption in the U.S.

Most of that growth in spending, however, was largely the result of growth in spending across the board and failed to increase the share of total spending allocated to fruits and vegetables. For example, although spending for fruit and vegetable research increased from $252 million to $484 million, the share of food-group research spending on fruit and vegetables declined from 25.3% to 24.1%. Similarly, while purchases of fruits and vegetables for nutrition assistance programs increased from $387 million to $520 million, the share of that spending allocated to fruits and vegetables fell from 38.5% to 37.5%.

In addition, half of the $2.036 billion fruit and vegetable spending increase—an estimated $1.015 billion—was the result of increases in WIC spending. Spending increases for fruits and vegetables, above and beyond the new vouchers, were largely the result of overall increases in WIC program spending, which grew from $2.853 billion in FY 2000 to $4.642 billion in FY 2009.

Figure 7. Change in USDA Fruit & Vegetable Spending and Recommended Servings

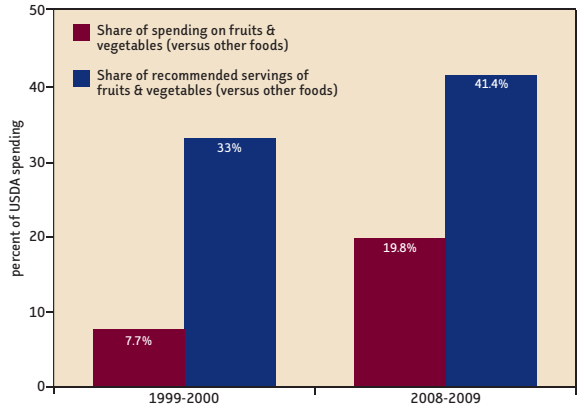


Table 23. Change in USDA Fruit and Vegetable Spending over Time

	Spending	% Share of Spending	% Share of Recommended Servings
1999-2000	$1,322,000,000	7.7%	33.0%
2008-2009	$3,358,000,000	19.8%	41.4%

Since FY 2000, the share of spending allocated by USDA to fruits and vegetables for research and purchases supporting nutrition assistance programs has declined. Nutrition education spending at USDA, as a percentage of nutrition assistance spending, increased from only 1.2% in FY 2000 to only 1.3% by FY 2008.

Deliberate efforts to increase fruit and vegetable spending are reflected in funding for two program areas: the WIC program and the farm bill. We estimate that the fruit and vegetable purchasing vouchers included in the Food and Nutrition Service's 2007 interim rule added more than $600 million in fruit and vegetable spending. Between 2000 and 2009, the farm bill added another $85 million in annual programs that subsidize the fruit and vegetable industry. In summary, only about one-third of the spending increase for the fruit and vegetable food group reflects a shift in USDA's spending priorities. The rest of the increased spending on fruits and vegetables resulted from an overall expansion of spending for all food groups.

Nonetheless, the potential for a relatively small increase in dedicated spending for fruits and vegetables to make a difference in American diets should not be underestimated. Assume, for example, that all of USDA's $567 million in average annual purchases of fruit and vegetable products[45] during FY 2008 and FY 2009 were distributed to children in the National School Lunch Program. That 1.03 billion pounds of fruit and vegetable products would increase the average daily intake of fruits and vegetables of the more than 31 million participants in the school meals programs by nearly a full serving (0.9). While that increase won't completely close the consumption gap for most students, it demonstrates that a relatively small investment, in comparison to total food group spending and the economic cost of the consumption gap, can make a significant dietary difference.

A Comparison of Nutrition Education Spending: FY 2000-FY 2008

Table 24 reports data for nutrition education spending in FY 2000. A comparison of FY 2000 data with data in Table 20 illustrates that, in terms of nominal dollars, federal spending on nutrition education has increased significantly for each of the nutrition assistance programs. Total federal nutrition education spending grew from $384 million FY 2000 to $753 million in FY 2008, a jump of 96%.

The comparison also shows, however, that, as a percent of total nutrition assistance spending, total nutrition education spending has remained flat. In other words, while overall nutrition assistance spending increased by $23.1 billion between FY 2000 and FY 2008, nutrition education spending grew by only $369 million, which equals just 1.6% of total growth.

Table 24. Nutrition Education for Nutrition Assistance Programs, FY 2000

Program	Nutrition Education Spending	Food Assistance Program Spending	% of Food Assistance Spending for Nutrition Education
5 A Day	$2,200,000	N/A	N/A
EFNEP	$59,000,000	N/A	N/A
Food Stamps	$99,000,000	$18,800,000,000	0.5%
Team Nutrition	$5,200,000	$9,856,000,000	0.1%
WIC Nutrition Education	$220,800,000	$4,153,000,000	5.3%
Total	$384,000,000	$32,809,000,000	1.2%

Despite a near-doubling of USDA spending on nutrition education since FY 2000, nutrition education appears to remain an afterthought relative to other food spending priorities. In a dubious demonstration of consistency, USDA nutrition education spending as a percentage of nutrition assistance spending started the decade at 1.2% and reached only 1.3% by FY 2008. Given the stagnation of fruit and vegetable consumption and surging costs associated with diet-related diseases, this consistency is another symptom of the federal government's inability to make diet-related health concerns a top spending priority.

NIH Research Priorities: FY 2000 Compared to FY 2008

Figures 8 and 9 and Table 25 present changes in selected indicators of the extent to which NIH made research on nutrition, fruits and vegetables a priority between FY 2000 and FY 2008.

The indicators in Table 25 capture the extent to which NIH's nutrition projects are focused on fruits and vegetables, overall nutrition education, and the promotion of fruit and vegetable consumption. Figures 8

and 9 provide information on the level of priority assigned to fruits and vegetables within NIH's research on coronary heart disease, stroke, and cancer.

Four primary conclusions can be drawn about NIH priorities between FY 2000 and FY 2008 from Figures 8 and 9 and Table 25:

- As illustrated in Figure 8, the most telling conclusion is that fruit and vegetable projects continue to comprise only a minute proportion of research conducted by NIH on major chronic diseases, despite the fact that inadequate fruit and vegetable consumption accounts for between 6% and 19% of the risk associated with those diseases. In FY 2000, those proportions ranged from 0% to 0.6%. For FY 2008, those proportions had hardly changed, staying below 1% and ranging from 0.4% to 0.6%.
- The percentage of chronic disease projects devoted to fruits and vegetables remains substantially lower than the contribution of diet to the risk for each of those diseases. Although the fruit and vegetable consumption gap accounts for 16% of the risk of coronary heart disease (Table 21), the proportion of NIH projects on coronary heart disease that pertains to fruits and vegetables increased from only 0.3% to only 0.5% between FY 2000 and FY 2008. For stroke, despite 19% of the risk being attributed to inadequate fruit and vegetable consumption, fruit and vegetable projects grew from 0% to 0.4% of stroke research projects between FY 2000 and FY 2008.

Table 25. Selected Indicators of Changes in NIH Fruit and Vegetable Research

Indicator	FY 2000	FY 2008
NIH projects on fruits and vegetables as a percent of NIH nutrition projects	4.1%	6.1%
Percent of NIH fruit and vegetable projects dedicated to promotion of, or nutrition education for, fruit and vegetables	23.9%	9.9%
NIH projects on promotion of, or nutrition education for, fruit and vegetables as a percent of NIH nutrition projects	1.0%	0.6%
NIH nutrition education projects as a percent of NIH nutrition projects	3.7%	1.1%

Figure 8. Percentage of NIH Chronic Disease Projects Devoted to Fruits & Vegetables

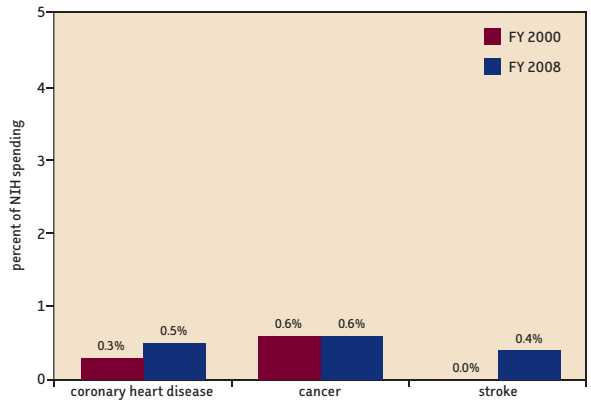
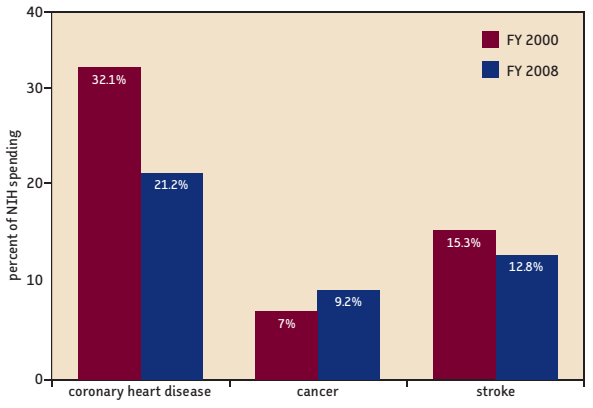


Figure 9. Percentage of NIH Chronic Disease Projects Devoted to Food, Diet, and Nutrition



- The percentage of chronic disease projects devoted to diet and nutrition has been stagnant or falling as shown in Figure 9. In other words, the priority given to diet as a cause of chronic illness at NIH has been declining relative to other research areas. For example, diet-related factors account for 30% of the risk of coronary heart disease. In FY 2000, the number of NIH diet-related research on that illness was in line with the risk (32%). However, by FY 2008, that percentage had dropped to 21%.
- As Table 25 demonstrates, NIH continues to assign a low priority to research focused on promoting fruit and vegetable consumption (and on nutrition education in general) and that priority has declined since FY 2000. By FY 2008, the number of fruit and vegetable promotion projects was less than one percent of the total number of NIH projects focused on nutrition.

Changes in Spending by the CDC: FY 2000 to FY 2008

Indicators of spending on diet-related programs at the CDC are presented in Table 26. The data show a growing commitment to the role of a healthy diet in reducing the risk of those illnesses.

Table 26. Changes in CDC Disease Prevention Spending[46]

Indicator of Priorities	FY 2000	FY 2008	% Increase
CDC Division of Nutrition, Physical Activity, and Obesity	$11,445,000	$42,200,000	268%
CDC budget for chronic disease prevention and health promotion	$699,000,000	$834,000,000	19%

As the table indicates, CDC spending targeted to diseases associated with inadequate nutrition and physical activity surged between FY 2000 and FY 2008. However, three caveats are in order:

- Nearly all of the increase in funding for the CDC's Division of Nutrition, Physical Activity and Obesity occurred during the first few years of the decade. In the five years between FY 2005 and FY 2009, its budget increased only 5.7%, from $41.9 million to $44.3 million, compared with a 16.2% increase in the Consumer Price Index for medical services.
- Although the budget of the Division of Nutrition, Physical Activity and Obesity surged, by FY 2008 it still was equal to only 5.1% (up from 1.6% in FY 2000) of the CDC's budget for chronic disease prevention and health promotion. That percentage falls short of the contribution of an inadequate diet to the risk of major chronic diseases (i.e., 20% to 30% of the risk).
- While the CDC's budget for chronic disease prevention and health increased by 19% between FY 2000 and FY 2008, it was dwarfed by the 40% increase in the Consumer Price Index for medical services and a 74% increase in the economic costs of diet-related diseases for the same period.

A diet high in fruits and vegetables is important for optimal child growth, maintaining a healthy weight, and prevention of chronic diseases such as diabetes, heart disease and some cancers, all of which currently contribute to health care costs in the United States.

–DR. WILLIAM H. DIETZ, DIRECTOR OF CDC'S DIVISION OF NUTRITION, PHYSICAL ACTIVITY AND OBESITY IN A SEPTEMBER 29, 2009 PRESS RELEASE.

VII. Closing the Federal Fruit and Vegetable Spending Gap

An Opportunity to Reshape Federal Funding Priorities

The federal spending and other data that have been compiled and analyzed in this report lead to the inescapable conclusion that fruits and vegetables continue to occupy a relatively low position in the hierarchy of food, agriculture, and public health priorities for the federal government. These findings are in conflict with four indisputable realities: 1) an inadequate and stagnating rate of fruit and vegetable consumption in the U.S. that falls far short of recommendations by the nation's public health experts both inside and outside of government; 2) the ability of increased consumption of fruits and vegetables to reduce significantly the risk of severe chronic diseases; 3) the severe hardships and heavy economic costs caused by those diseases; and 4) the statements of federal officials about the importance of addressing the fruit and vegetable consumption gap.

Data gathered for the years around the turn of the 21st century lead to the additional conclusion that this failure to prioritize fruits and vegetables on the national policy agenda can, in general, be characterized as an ongoing, chronic problem that will be reversed only if a qualitative shift in policy priorities occurs. With a couple of exceptions, federal spending patterns in FY 2008 and FY 2009 largely resemble those in FY 2000. When the data do indicate increases in specific spending areas, such as the increase in USDA research spending on fruits and vegetables from FY 2000 to FY 2008, a closer examination reveals that the proportion of available resources (e.g., research funding) allocated to fruits and vegetables either remained the same or declined.

There have been a few changes that could pave the way for a reordering of federal government priorities. These include the investment surge in fruit and vegetable related programs in the 2008 Farm Bill, the increased budgets at the CDC for nutrition, physical activity, and obesity, and the fruit and vegetable vouchers added to the WIC program. Overall, however, and in most instances, spending has remained at relatively low levels in spite of inadequate and stagnating fruit and vegetable consumption, skyrocketing economic costs for diet-related chronic diseases, and an increase in the recommended consumption levels for fruits and vegetables recommended in the 2005 Dietary Guidelines.

This problem of misplaced priorities is not simply isolated to a single major area of concern. As the data show, the problem cuts across virtually every aspect of federal food, agriculture, and public health spending—from agriculture subsidies and research to nutrition education to public health research—and across multiple federal agencies. The pattern of under-investment in initiatives that supports both greater consumption and a larger public health role for fruits and vegetables, virtually across the board, continues to undermine the potential for these foods to make their full contribution to the well-being of the American people. Even in the one subsector in which federal spending nearly reflects the importance of fruits and vegetables in the Dietary Guidelines—that is, nutrition assistance programs—the positive impact of current spending, the enormity of the consumption gap, and the low priority given to nutrition education indicates that much more could still be done.

The Case for Increased Federal Spending on Fruits and Vegetables

In view of the key findings in the report, the case for far more federal spending across the board is not difficult to make. These findings include, but are not limited to the following:

- The U.S. fruit and vegetable consumption gap is substantial and is growing—the average U.S. resident consumes only 51% of the recommended levels of fruits and vegetables.
- The economic cost of just three diet-related, chronic diseases associated with the fruit and vegetable consumption gap grew by 92% between 1999 and 2007-09 and currently stands at $56 billion a year.
- USDA spends more than twice the amount of its funds on the meat group, which comprises only 8% of daily servings recommended in the Dietary Guidelines, than it spends on fruits and vegetables, which comprise 41% of recommended daily servings.
- USDA, NIH, and the CDC spend only about 2.8% of their combined budgets on fruit and vegetable specific activities. Although the proportion of total food group spending by USDA allocated to fruits and vegetables more than doubled between FY 2000 and FY 2008, most of that increase was the result of increased spending for a single program, namely WIC; in critical areas, such as research and nutrition education, the proportion of spending allocated to fruits and vegetables declined or stagnated.

- Since spending on subsidies authorized in the farm bill comprises about 50% of total food group specific spending and fruits and vegetables receive only 9.8% of those subsidies, reallocation of the farm bill budget offers one major opportunity for giving greater funding priority to fruit and vegetable programs.
- Spending for nutrition education that promotes fruits and vegetables and serves mostly low-income Americans represents only 1.3% of total spending on nutrition assistance programs, despite the fact that the fruit and vegetable consumption gap has historically been higher than average for that segment of our population.
- Nutrition education continues to be a very low priority at NIH—as a percentage of nutrition projects, nutrition education projects overall comprise 1%, while nutrition education projects covering fruits and vegetable consumption comprise less than 1%.
- NIH spending for fruit and vegetable research associated with three major chronic diseases (i.e., cancer, coronary heart disease, and stroke) accounted for 0.78% (less than one percent) of total research spending on those diseases, despite the fact that inadequate fruit and vegetable consumption accounts for between 6% and 20% of the risk associated with those illnesses and costs $56 billion a year.
- Despite giving low priority to fruit and vegetable projects in the year FY 2000, virtually all indicators of the level of priority given by NIH to fruit and vegetable projects declined between FY 2000 and FY 2008.

Addressing the Federal Spending Gap: A Path Forward

To close the federal spending, research, and education gap documented in this report would require neither reinventing the wheel nor adding (or reallocating) relatively large amounts of funding. It would, however, require more than just supportive statements by high-level federal officials, including: a broader vision of economic security; a greater commitment to prevention and risk-reduction as the long-term key to public health; and the political will to add to and/or reallocate resources within a historically slow-moving, federal food-and-public health complex.

. . . USDA's fruit and vegetable *spending* gap closely tracks the U.S. fruit and vegetable *consumption* gap.

The federal government already has relevant programmatic machinery and infrastructure in place, on both the supply-side and demand-side of the fruit and vegetable equation. The massive federal food, agriculture, and public health research system, the federal nutrition programs, and the existing health promotion and social marketing resources of USDA and HHS offer short-term and long-term opportunities for far greater federal engagement.

In addition, there is no shortage of resources. USDA, NIH, and the CDC spent about $126 billion in FY 2008 on activities related to food, agriculture, and public health.[47] In FY 2008, less than 3% of those combined budgets was spent on programs and projects related directly to fruits and vegetables. That year, fruit and vegetable projects at NIH accounted for only about 0.4% (less than 1%) of the NIH budget.

Recommendation #1. Align USDA Spending with Dietary Recommendations

The total daily recommended food servings in the U.S. Dietary Guidelines are divided among five food groups: grains, meats, dairy, fats and oils, and fruits and vegetables. Fruits and vegetables comprise 41.4% of those recommended daily servings. Yet, in FY 2008, less than 19.8% of USDA's spending on those five food groups was dedicated to fruits and vegetables.

USDA, through its spending, has therefore relegated fruits and vegetables to a priority level that is less than one-half the priority level assigned to fruits and vegetables by the Dietary Guidelines, which ironically were developed by USDA in cooperation with HHS. Moreover, the average U.S. consumer is eating only half of the recommended level of daily servings of fruits and vegetables. In other words, USDA's fruit and vegetable *spending* gap closely tracks the U.S. fruit and vegetable *consumption* gap.

To close this spending gap and align its fruit and vegetable spending with the serving recommendations in the Dietary Guidelines, USDA would need to more than double its investment in fruit and vegetable initiatives. Specifically, USDA's FY 2008 spending on fruits and vegetables would have had to increase by $3.65 billion from $3.36 billion to $7.01 billion.[48] That $3.65 billion increase would have represented only 4% of USDA's total budget in FY 2008.[49]

There are numerous examples of how such an increase in USDA spending could help close the fruit and vegetable consumption gap. For example, more research could be conducted on: the causes of the consumption gap; ways to improve nutrition education and promotional programs; policies that would create incentives for consumers to enhance intake; increasing productivity on fruit and vegetable farms

to maintain farm profitability while increasing the supply and reducing the prices of fruits and vegetables; and new products that will appeal strongly to consumers. (In FY 2008, fruit and vegetable research accounted for only 24.1% of USDA food group research spending.)

The deep pockets of the farm bill could also be utilized to create profitable incentives for fruit and vegetable growers to increase their output and to market their produce to local consumers. (Spending on fruits and vegetables comprised only 9.8% of total food group spending in the 2008 Farm Bill.) Enhanced fruit and vegetable promotional and advertising programs could be funded to increase the appeal of fruit and vegetable products to U.S. consumers. And, USDA could expand its nutrition education programs, placing increased emphasis on fruits and vegetables.

Recommendation #2: Elevate Nutrition Education as a Priority at USDA

As evidenced by the successful EFNEP program experience—EFNEP interventions generated an average increase in intake of nearly two servings a day of fruits and vegetables—nutrition education has a critical role to play in helping Americans close the fruit and vegetable consumption gap. In FY 2008, USDA allocated only 1.2% of its total spending on nutrition assistance programs to nutrition education for the beneficiaries of those programs. In that year, EFNEP had 518,000 participants, compared to more than 28 million SNAP program participants.[50]

In this report, spending per participant for the successful EFNEP program is the performance standard used to estimate the size of the USDA nutrition education gap for low-income families. The target audience for expansion of the EFNEP-level nutrition education in the analysis is the SNAP program's 28,410,000 participants.[51] After accounting for the 243,000 EFNEP participants and the 2,156,000 WIC participants who participate in SNAP,[52] it was determined that the added cost of bringing EFNEP-level nutrition education to all SNAP participants would be $1.011 billion. That increase, from $314 million to $1.325 billion, would be equal to only 2.7% of the $37.661 billion cost of the SNAP program in FY 2008.[53]

Recommendation #3: Allocate NIH Funding Based on the Disease-Prevention Benefits of Fruit and Vegetable Consumption

For NIH, which is in the business of disease prevention and treatment, the primary lens through which we view fruit and vegetable spending is the risk of chronic disease associated with inadequate fruit and vegetable consumption.[54] For each of the chronic diseases, fruit and vegetable spending should be driven by that contribution to risk and a focus on disease prevention and health promotion, as opposed to treating diseases after they occur.

3 a. Balance the NIH Prevention Portfolio

Table 27 presents an analysis of the fruit and vegetable research spending gap at NIH. For strokes, for example, the fruit and vegetable consumption gap is associated with 19.3% of stroke risk. NIH spent $1.006 billion on stroke research in FY 2008. Only $4.6 million (0.46%) of the total was allocated to research on fruits and vegetables. We assume 25% of the total stroke funding should be allocated to stroke *prevention* (as opposed to treatment) research.[55] A total of $48.5 million would be needed to give fruits and vegetables their 'fair,' prevention-oriented share of the stroke research budget. To close the fruit and vegetable research gap for strokes, therefore, would require an additional $43.9 million in NIH spending.

Table 27. The NIH Fruit and Vegetable Research Spending Gap

	FY 2008 Total Spending for Chronic Diseases	FY 2008 Spending on Fruit and Vegetable Projects	% Risk Due to Fruit and Vegetable Consumption Gap	'Fair' Share for Fruits and Vegetables	Additional Spending to Reach 'Fair' Share
Cancer	$5,570,000,000	$41,327,000	6%	$83,550,000	$42,223,000
Coronary Heart Disease	$596,723,000	$2,482,000	16%	$23,869,000	$21,387,000
Stroke	$1,006,051,000	$4,613,000	19%	$48,542,000	$43,929,000
Total	$7,172,774,000	$48,422,000	N/A	$155,961,000	$107,539,000

The analysis of all three diseases—stroke, coronary heart disease and cancer—shows that closing the NIH fruit and vegetable research gap for those diseases would require an additional $107.5 million. That estimate represents a minimum level of additional funding since inadequate fruit and vegetable consumption has also been found to increase the risk of other health problems, such as diabetes and obesity, which were not included in this analysis.[56]

3 b. Align NIH Fruit and Vegetable Spending with Spending on Anti-Tobacco Use

A similar risk-based analysis was conducted to determine how the allocation of NIH funding for fruits and vegetables compares with NIH spending on tobacco- and smoking-related projects. The findings are reported in Table 28 and generated results that are similar to findings in Table 27.

The analysis places the inadequate consumption of fruits and vegetables on the same risk-based footing as tobacco for stroke, cancer, and coronary heart disease. Once the amount of spending for every 1% of risk contributed by tobacco use was determined, that amount of spending per unit of risk was applied to spending for fruits and vegetables. The analysis found that NIH under-funded its fruit and vegetable activities related to the three diseases by $97 million in FY 2008. Again, this estimate represents a minimum level of additional funding needed to close NIH's fruit and vegetable spending gap since it does not cover other health problems associated with inadequate fruit and vegetable consumption.

To summarize, the similar findings in Tables 27 and 28 indicate that, for the three diseases, NIH spending—$48.4 million in FY 2008—fell short by roughly $100 million. In other words, for those diseases, NIH in FY 2008 was spending only about one-third of the amount it should have been spending to help address health problems created by inadequate fruit and vegetable consumption.

Table 28. NIH Spending on Fruits/Vegetables and Tobacco/Smoking

	FY 2008 Total Spending for Chronic Disease	FY 2008 Spending on Tobacco and Smoking Projects	% Risk Due to Tobacco Use[57]	Spending per Every 1% of Risk	'Fair' Share for Fruits and Vegetables	Additional Spending to Reach 'Fair' Share
Cancer	$5,570,000,000	$344,777,000	30%	$11,493,000	$68,955,000	$27,628,000
Coronary Heart Disease	$596,723,000	$44,850,000	21%	$2,136,000	$34,171,000	$31,689,000
Stroke	$1,006,051,000	$40,242,000	18%	$2,236,000	$43,148,000	$38,535,000
Total	$7,172,774,000	$429,869,000	N/A	N/A	$146,275,000	$97,853,000

Recommendation #4: Bring CDC Fruit and Vegetable Spending in Line with Chronic Disease Health Risks

A risk-based analysis, similar to the one performed above to identify the NIH fruit and vegetable research gap, can be undertaken to determine the extent to which CDC spending on fruits and vegetables reflects the health consequences of inadequate fruit and vegetable consumption. The CDC does not have either a specific disease-prevention program dedicated solely to fruits and vegetable or a budgetary line item for fruit and vegetable related activities.

However, significant elements of the programs of the CDC's Division of Nutrition, Physical Activity and Obesity are focused on dietary improvements that would address the fruit and vegetable consumption gap. We estimate that 50% of the DNPAO's activities are focused on the diet and health nexus. If we assign 41.4% of those nutrition activities to fruits and vegetables–that's the percentage of daily food servings recommended by the Dietary Guidelines–then 20.7% of the DNPAO's $42.2 million budget in FY 2008, or $8.7 million, should be assigned to fruit and vegetable related activities.

The CDC does have a separate anti-tobacco program, which received $104.2 million in funding in FY 2008.[58] This information, combined with data on cancer, heart disease, and stroke, allows for the determination of the amount CDC would have had to spend on fruits and vegetables in FY 2008 to bring fruit and vegetable spending into parity with tobacco spending.

Table 29. Contributions to Risks of Three Chronic Diseases

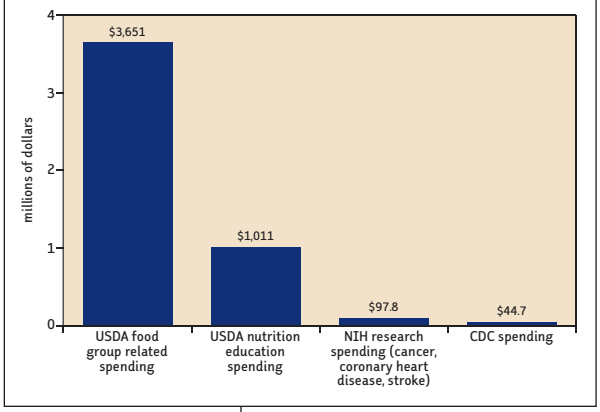
	% Risk Due to Fruit and Vegetable Consumption Gap	% Risk Due to Tobacco and Smoking	% of U.S. Deaths Caused by all Three Diseases
Cancer	6%	30%	50.7%
Coronary Heart Disease	16%	21%	37.7%
Stroke	19%	18%	11.6%

The contributions to the risks of the three diseases by tobacco use and the fruit and vegetable consumption gap are reported in Table 29. If tobacco use and the fruit and vegetable consumption gap make the same contributions to the risks of each of the three diseases, one would expect that the prevention-oriented CDC would allocate the same amount of resources to these two program areas. In fact, as shown in Table 29, the risks associated with tobacco use and the fruit and vegetable gap are similar for coronary heart disease and stroke. However, there is a large gap between the respective risk contributions for cancer (30% vs. 6%). Therefore, CDC spending on anti-tobacco programs should exceed spending on fruit and vegetable activities. The question is whether tobacco spending in FY 2008 exceeded fruit and vegetable spending in that year by an amount that reflected these disease-related risk parameters. (In FY 2008, as discussed above, the CDC spent an estimated $8.7 million on fruit and vegetable activities or only 8.4% of the amount spent on its anti-tobacco program.)

A crude estimate of the desired relationship between spending for the two disease-prevention areas could be obtained by simply dividing the sum of the risks caused by the fruit and vegetable consumption gap in Table 29 by the sum of the risks due to tobacco use. Instead, in recognition of the fact that not all chronic diseases are equal in terms of the toll they take on the American people, we weighted the disease risks in terms of their relative importance by multiplying them by the death rates in the third column of Table 29.[59]

The analysis found that CDC spending on fruit and vegetable activities should have been equal to 51.3%, not 8.4%, of anti-tobacco spending in FY 2008.[60] Therefore, spending on fruit and vegetable activities would have had to have risen from $8.7 million to $53.4 million in FY 2008 to have been on par with the CDC's investment in anti-tobacco programs. In other words, the CDC's fruit and vegetable spending gap for FY 2008 was equal to $44.7 million.

Figure 10. Additional Spending on Fruits & Vegetables Needed to Reach Fair Share



Summary: The Cost-Effectiveness of Closing the Federal Fruit and Vegetable Spending Gap

Taken together, the four additional investments needed to close the spending gap addressed in this report total $4.8 billion or the equivalent of only 3.5% of the total spending by USDA, NIH, and the CDC in FY 2008.[61] Figure 10 reports spending gaps by agency. Given the public health and economic stakes for the nation, that level of increased investment does not appear to be unreasonable. The annual economic cost of the fruit and vegetable consumption gap with respect to cancer, coronary heart disease, and stroke is estimated to be $56.3 billion (Table 9), which is nearly 12 times the level of spending needed to close the gap. The additional, or reallocated, investments needed to close the fruit and vegetable spending gap promise high benefit-cost ratios *and* reductions in devastating chronic illnesses, both of which will make those investments attractive to the public and policy makers.[62]

Taken together, the four additional investments needed to close the spending gap addressed in this report total $4.8 billion or the equivalent of only 3.5% of the total spending by USDA, NIH, and the CDC in FY 2008.

Endnotes

[1] Throughout this report, fruits and vegetables refer to those that are fresh, canned, frozen, dried or juiced.

[2] H. Blanck, Gillespie C, Kimmons J, Seymour J, Serdula M. "Trends in Fruit and Vegetable Consumption among U.S. Men and Women, 1994–2005," *Preventing Chronic Disease 2008*;5(2). http://www.cdc.gov/pcd/issues/2008/apr/07_0049.htm

[3] Joel Kimmons, Gillespie, C., Seymour, J., Serdula, J., Michels-Blanck, H. "Fruit and Vegetable Intake Among Adolescents and Adults in the United States: Percentage Meeting Individualized Recommendations," *Medscape Journal of Medicine 2009*; 11(1).

[4] K. Grimm, Blanck, H., Scanlon, K., Moore, L., Grummer-Strawn, L. "State-Specific Trends in Fruit and Vegetable Consumption Among Adults—United States, 2000-2009," *MMWR Weekly*. September 10, 2010 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5935a1.htm

[5] The source of average caloric intake data is: surveys cited in "Fruit and Vegetable Consumption among Adults—United States, 2005," *MMWR Weekly*. March 16, 2007/56(10): 213-217. www.cdc.gov/mmwrhtml/mm5610a2.htm

[6] The recommended number of servings was drawn from *2005 U.S. Dietary Guidelines for Americans*, Appendix A-2. For this report, the recommended numbers of cups and ounces were converted to servings. Although the new Dietary Guidelines moved from the number of servings to ounces and cups to make the recommendations more precise and practical, this report shows food-intake recommendations in terms of numbers of servings in order to enable standardized comparisons to be made across food groups, for which recommendations are made in different units of measurement.

[7] "U.S. Per Capita Loss-Adjusted Food Availability: *Custom Reports*." http://www.ers.usda.gov/Data/FoodConsumption/app/loss_adjusted.aspx

[8] Common examples of starchy vegetables include potatoes, beets, sweet corn, lima beans, and green peas. Other vegetables that are high in starch, such as carrots, sweet potatoes, and pumpkins, are placed in a separate "orange" vegetable category in the Dietary Guidelines to reflect their unique nutritional contribution to a healthy overall diet.

[9] The Dietary Guidelines call for 3 cups (i.e., 6 servings) of starchy vegetables per week for a 2000-calorie diet and 6 cups (i.e., 12 servings) for a 2200-calorie diet. This is the only example in the guidelines of a 3-cup jump in the recommended serving levels for a 200-unit increase in caloric intake. For all other vegetables, the increases range between a half cup and 1.5 cups for every 200-calorie increase.

[10] Estimates drawn from consumer surveys of the daily number of servings of fruits and vegetables eaten are consistent with the estimates made from USDA's food availability data set. For example, results of the 1994-1998 Continuing Survey of Food Intake for Individuals, which has been discontinued, found an average of 1.5 servings of fruits and 3.1 servings of vegetables were consumed during the survey period, compared to 1.8 and 3.6 servings, respectively, according to USDA's food availability dataset. (For the CSFII results, see: Linda Scott Kantor, "A Dietary Assessment of the U.S. Food Supply," *AER-772*. ERS, USDA. December 1998. http://www.ers.usda.gov/publications/aer772/aer772a.pdf)

[11] "Studies suggest that improved diets could reduce CHD and stroke mortality by at least 20 percent, and cancer and diabetes mortality by at least 30 percent (McGinnis and Foege, 1993; Willett, Colditz, and Mueller, 1996; and Trichopoulos, Li, and Hunter, 1996). These estimates are consistent with other estimates on the potential reduction in mortality based on risk removal (Rothenberg and Koplan, 1990; Gori and Richter, 1978)." Elizabeth Frazao. "High Costs of Poor Eating Patterns in the United States," *Agricultural Information Bulletin* 750. Economic Research Service, USDA. 1999.

[12] Although a great deal of attention is being paid to the nation's obesity epidemic, it was not included as a specific focus of this analysis, given that it is recognized as a risk factor for chronic diseases, such as diabetes, high blood pressure, stroke, heart disease, and cancer, covered in this analysis. Inclusion of a separate category for obesity would have resulted in virtually complete double-counting. See, for example, the CDC's: "Overweight and Obesity: Health Consequences." (http://www.cdc.gov/obesity/causes/health.html)

[13] Additional references to the relationships between diet and chronic illnesses from a General Accountability Office (GAO) study are presented on page 8 in the context of the estimation of the costs of inadequate fruit and vegetable consumption on chronic diseases.

[14] J. Michael McGinnis, Foege W. "Actual causes of death in the United States," *Journal of the American Medical Association* 1993, Vol. 270, No.18, pp. 2207-2212, http://jama.ama-assn.org/cgi/content/abstract/270/18/2207

[15] Danaei G, Ding E.L., Mozaffarian D., Taylor B., Rehm J., et al. "The Preventable Causes of Death in the United States: Comparative Risk Assessment of Dietary, Lifestyle, and Metabolic Risk Factors," *PLoS Med* 6(4), 2009. http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1000058

[16] American Cancer Society. "Cancer Facts and Figures—010." http://www.cancer.org/acs/groups/content/@nho/documents/document/acspc-024113.pdf

[17] World Health Organization. "Diet, Nutrition and the Prevention of Chronic Diseases," *WHO Technical Report Series* No. 916. Geneva, 2003.

[18] The results of the ongoing program were reported in the February 2002 issue of the *New England Journal of Medicine*, February 2002.

[19] F.B. Hu, Stampfer M.J., Manson J.E., Grodstein F., Colditz G.A., Speizer F.E., Willett W.C. "Trends in the incidence of coronary heart disease and changes in diet and lifestyle in women," *New England Journal of Medicine*. August 24, 2000.

[20] USDA and HHS. *2005 Dietary Guidelines for Americans*.

[21] Estimates of direct medical costs and total economic costs for this table were drawn from the following sources: 1) CDC. "2007 National Diabetes Fact Sheet," http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf; 2) American Cancer Society; http://www.cancer.org/cancer/cancerbasics/economic-impact-of-cancer; and 3) American Heart Association, "Heart Disease and Stroke Statistics, 2010 Update-at-a-glance," http://www.americanheart.org/downloadable/heart/1265665152970DS-3241%20 HeartStrokeUpdate_2010.pdf

[22] According to Frazao's study, diet-related causes account for: 30% of the risk of cancer and of diabetes; and 20% of the risk of coronary heart disease and stroke. Additionally, as reported by Frazao, 55% of diabetics die from cardiovascular disease. These costs are already accounted for under coronary heart disease and stroke. Therefore, only the remaining 45% of the costs associated with diabetes represent incremental costs and are reflected in Table 7.

[23] The methodology for determining costs for 1999 is the same as the one used to determine the costs in Table 7.

[24] U.S.GAO. "Fruits and Vegetables: Enhanced Federal Efforts to Increase Consumption Could Yield Health Benefits for Americans," June 2002, http://www.gao.gov/new.items/d02657.pdf

[25] For other summaries, see, for example: 1) Iowa State University Extension. "The Health Value of Fruits and Vegetables," PM 1855, July 2000; and 2) World Health Organization. "Fruits, Vegetables and Non-Communicable Disease Prevention." http://www.who.int/dietphysicalactivity/publications/facts/fruit/en/index.html

[26] Paolo Boffetta, Couto E., Wichmann, J. Ferrari, P. et al. "Fruit and Vegetable Intake and Overall Cancer Risk in the European Prospective Investigation Into Cancer and Nutrition (EPIC)," *Journal of the National Cancer Institute* 2010, 102(8).

[27] Use of this recent estimate, rather than previous higher estimates of the contribution of fruits and vegetables to cancer risk, helps ensure that the economic cost estimates derived in this subsection of the report are relatively conservative.

[28] Risk coefficients associated with closing the fruit and vegetable gap (4.8 servings) were derived from studies referenced earlier for coronary heart disease (16.0%) and stroke (19.3%). Diabetes was not included in Table 9, given a series of recent public health studies that showed conflicting findings of the impact of fruit and vegetable consumption on diabetes.

[29] For some spending categories, such as research, FY 2008 data were the latest available. For other spending categories, such as farm bill commodity programs, averages of 2008 and 2009 data were used to smooth out year-to-year fluctuations. Data used to derive commodity subsidy spending totals for food groups were obtained from Economic Research Service online spreadsheets (see, for example, http://www.ers.usda.gov/Publications/AgOutlook/AOTables/), federal budget documents, and the Environmental Working Group's Farm Subsidy Database (http://farm.ewg.org/).

[30] Current Research Information System. Table C: National Summary USDA, SAES, and Other Institutions' Fiscal Year 2008 Funds (Thousands) and Scientist Years, by subject of investigation. www.cris.crees.usda.gov/fsummaries.html#2008

[31] USDA spending on the Supplementary Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, was not included in this analysis. This section of the report includes only spending allocations made directly by Congress and USDA that divide available funding among the primary food groups. How SNAP dollars are allocated among the major food groups is determined by decisions made by recipients of SNAP subsidies, not USDA and Congress, since there are no requirements imposed on program beneficiaries with respect to how they spend their program benefits among the main food groups.

[32] WIC spending estimates were derived from cost estimates found at http://www.fns.usda.gov/wic/regspublished/WICfoodpkg-additionaldataforRIA.pdf and participation data found in USDA, Food and Nutrition Service. "WIC Participant and Program Characteristics, 2008," *Special Nutrition Programs Report No. WIC-08-PC*. January 2010. (http://www.fns.usda.gov/ora/menu/published/wic/FILES/pc2008.pdf.) For details on the interim rule that established the fruit and vegetable voucher program, see: http://www.fns.usda.gov/wic/regspublished/wicfoodpkginterimrulepdf.pdf. Estimates in Table 14 do not include the cost of infant formula purchased through WIC benefits.

[33] This estimate includes $73.46 million in annual expenses for the Bureau of Land Management's rangeland program, which parallels the U.S. Forest Service's grazing management program. It does not, however, include food safety spending. It would be beyond the scope of this report to quantify federal food safety expenditures for non-meat, poultry, and fish products. Meat and poultry products are regulated by USDA's Food Safety Inspection Service. However, food safety for products from other food groups (e.g., pesticide residues for grains, oilseeds, fruits, and vegetables) are regulated by a number of different agencies without specific budget line items for each of those food groups.

[34] Each entry in Table 16 is equal to the sum of relevant entries in Tables 12 through 15.

[35] By far the largest nutrition assistance program, SNAP, which cost $50.36 billion in FY 2009, does not offer USDA an opportunity to affect the food consumption mix of program participants since participants decide which foods they will purchase.

[36] http://www.csrees.usda.gov/nea/food/efnep/about.html

[37] Food and Nutrition Service, Office of Research and Analysis, USDA. *Nutrition Education and Promotion: The Role of FNS in helping Low-Income Families Make Healthier Eating and Lifestyle Choices: A Report to Congress* March, 2010.

[38] http://teamnutrition.usda.gov/

[39] Food and Nutrition Service, March, 2010.

[40] EFNEP is not included in Table 19 since it is not part of another nutrition assistance program. However, 47.6% and 47.1% of EFNEP participants were also enrolled in the WIC and SNAP programs respectively.

[41] Two examples of studies showing the limited impact of nutrition assistance programs on fruit and vegetable intake include: 1) Parke E. Wilde, Paul E. McNamara, and Christine K. Ranney, "The Effect on Dietary Quality of Participation in Selected Nutrition Assistance Programs: Implications for Nutrition Monitoring and Nutrition Education." *Food Assistance and Nutrition Research Report No. 9 (FANRR-9)*. Fall 2000; and 2) Mary K. Fox et al. *WIC Nutrition Education Assessment Final Report*. February, 1999. http://www.fns.usda.gov/ora/menu/published/wic/FILES/momexec.pdf

[42] www.csrees.usda.gov/nea/food/pdfs/Final_FY08_EFNEP_Fact_Sheet_FOR_WEB_09_08_2009.pdf

[43] Lorrene Ritchie, Whaley, S., Spector, P., Gomez, J., Crawford, P. et al. "Favorable Impact of Nutrition Education on California WIC Families," *Journal of Nutrition Education and Behavior 2010;* (42)3.

[44] The EFNEP program includes five topical areas. Two of these categories, or 40%, were counted as nutrition education. Therefore, only 40% of spending per participant is reflected in Table 20.

[45] For information on the amount and value of AMS fruits and vegetables, see, for example, http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5081598

[46] Data source: various issues of HHS submissions to Congress for CDC's budget requests: "Justification of Estimates for Appropriations Committees." For the FY 2010 request, which contains data on FY 2008 spending, see: http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf

[47] http://www.omb.gov

[48] This calculation is based on data in Table 16.

[49] http://www.obpa.usda.gov/budsum/budget_summary.html

[50] USDA, FNS. EFNEP FY 2008 National Data Report. http://www.csrees.usda.gov/nea/food/efnep/pdf/08_national_data_report.pdf

[51] USDA, FNS. Supplemental Nutrition Assistance Program Participation and Costs Annual Summaries. http://www.fns.usda.gov/pd/SNAPsummary.htm

[52] USDA, FNS. "WIC Participant and Program Characteristics, 2008," *Special Nutrition Programs Report No. WIC-08-PC*. January 2010. http://www.fns.usda.gov/ora/menu/published/wic/FILES/pc2008.pdf ; USDA, FNS. EFNEP FY 2008 National Data Report.

[53] USDA, FNS. Supplemental Nutrition Assistance Program Participation and Costs Annual Summaries. http://www.fns.usda.gov/pd/SNAPsummary.htm

[54] Table 21 reported the contribution of the fruit and vegetable consumption gap to the risks of cancer (6%), coronary heart disease (16%), and stroke (19.3%).

[55] A search of NIH Reporter database categories found that prevention-oriented research at NIH comprised 25.1% of the total number of research projects undertaken by NIH in FY 2008.

[56] Obesity was not covered here to avoid the inevitable double-counting that would result from the strong relationship between obesity and coronary heart disease, for example. Diabetes was avoided since the epidemiological literature is divided about whether there is a positive relationship between inadequate fruit and vegetable consumption and the risk of diabetes.

[57] See, for example: National Cancer Institute. "Cigarette Smoking as a Cause of Cancer," *Risk Factors*. http://rex.nci.nih.gov/NCI_Pub_Interface/raterisk/risks67.html; Campaign for Tobacco Free Kids. "Health Harms from Smoking and Other Tobacco Use." http://www.tobaccofreekids.org/research/factsheets/pdf/0194.pdf; American Heart Association. "Cigarette Smoking, Heart Disease and Stroke." http://circ.ahajournals.org/cgi/content/full/96/9/3243

[58] See HHS submission to Congress for CDC FY 2010 budget request. http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf

[59] The three diseases accounted for 48.3% of all U.S. deaths in 2007. Cancer, for example, accounted for 24.5% of all U.S. deaths or 50.7% of the deaths accounted for by the three chronic diseases as shown in Table 29. The contributions to the risks of coronary heart disease and stroke were weighted by .377 and .116, respectively. HHS, CDC. "Deaths: Final Data for 2007," *National Vital Statistics Reports*. Volume 58, No. 19. May 2010. http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf

[60] The crude estimate would have found that total fruit and vegetable risk was 59.9% (not 51.3%) of total tobacco risk and that fruit and vegetable spending should equal 59.9% of anti-tobacco program spending. The weighted risks used in this analysis, therefore, provide a more-conservative estimate of the CDC fruit and vegetable spending gap.

[61] For the NIH spending gap, the tobacco-related analysis was included in the summation to provide consistency with the CDC tobacco-related analysis.

[62] For example, a May 2009 poll of more than 1,000 U.S. voters, commissioned by the Robert Wood Johnson Foundation, found that "More than three-quarters of Americans believe the country should invest more in keeping people healthier, and by a nearly 4-to-1 ratio, they support putting more emphasis on preventing disease rather than treating people after they become sick." http://www.rwjf.org/publichealth/product.jsp?id=43811

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