

An Empirical Review and Policy Analysis of Disease Prevention and Health Promotion Programs

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Executive Summary

The skyrocketing costs of healthcare associated with the prevalence of chronic diseases have prompted a multitude of government efforts to address the behavioral factors contributing to this trend. The Healthy People 2010 initiative serves as a national blueprint for health promotion and disease prevention efforts. Through Healthy People 2010, the federal government attempts to communicate to the public what is harmful, harmless, and helpful to a person's health. Its emphasis on preventive health presents a substantial challenge because it involves persuading people to make positive changes to their behavior and lifestyle.

This project seeks to elucidate the association (if indeed there is one) between federal money spent on health promotion and disease prevention programs, on the one hand, and actual changes of behavior on the other. This inquiry is ambitious, so in order to avoid confusion and maintain focus, our group decided upon four focus areas; type II diabetes, heart disease (not including stroke), cervical cancer, and arthritis. To clearly define and follow a particular money trail, we tracked the distribution of PHHS block grants given to various states and the programs these states initiated with the money.

An examination of the experiences of the states receiving both high and low quantities of PHHSBG dollars for programs relevant to the study's four focus areas revealed many indications of smaller-scale positive effects. Data from most of the states analyzed report positive changes in health-related behavior ranging from 1 percentage point to as many as 7 percentage points. These increases in the physical activity level and fruit and vegetable intake show that specific state programs and initiatives might greatly contribute to the change in the individual behavior.

In contrast to the results of the micro-level analysis of state programs, the results of regression analysis seem to suggest that, generally, spending does not influence behavior. With the exception of one statistically significant effect, both linear and nonlinear regression techniques indicate that spending has no measurable effect upon health status, fruit and vegetable intake, activity level, and utilization of preventive tests. The single statistically significant relationship, identified between spending in the year 2000 and regular physical activity, may be indicative of a delayed behavioral response to spending not captured by this analysis.

In light of these findings, it appears that federal funding is capable of affecting behavior. However, this capacity appears to be related to the degree to which funding is targeted. As evidenced by the contradictory results of the micro-level state analysis and the macro-level regression analysis, flexible state funding through PHHSBG is very important to assure that each state can develop programs targeting state-specific problems and populations. Programs and initiatives that focus on particular groups or localities within states seem to be the best way to achieve goals relating to health promotion and disease prevention. For these reasons, it is recommended that the federal government

continue to appropriate funding for programs, such as the PHHSBG, that allow states to address their specific health concerns in unique and innovative ways.

There are significant limitations associated with this analysis that are worth considering when interpreting and attempting to generalize its results. One limitation emerges from the lack of data available for both spending and behavioral changes over the five year timeframe of this study. The five year interval examined in this study may be too narrow to observe changes in behavior that can be linked to spending on health promotion and disease prevention. It is also worth considering that, given the multitude of observable and unobservable factors likely to affect behavior, it may be impossible to entirely isolate the effects of federal spending upon behavior. Ideally, future studies would attempt to combat these limitations through inclusion of more extensive historical data and greater utilization of experimental methods.

I. Introduction

Background

In the 20th century, America witnessed a dramatic decrease in the rate of infectious and communicable diseases. In many ways, the American populous has never been healthier in part to the concerted efforts of governmental public health programs and services as well as a marked increase in the efficacy of certain medical technologies and procedures.

Healthy People, started in 1979 and updated every decade, seeks to further improve upon the progress already made, especially in terms of the degenerative diseases that have gripped the nation. We are focusing our analysis on the most recent version, Healthy People 2010. Healthy People 2010 is a comprehensive set of disease prevention and health promotion objectives for the nation, created by scientists both inside and outside of government. The program is housed within the U.S. Department of Health and Human Services. The main thrust of the program, (as stated in the original 1979 Surgeon General's report), centers on the belief that "further improvements in the health of the American people can and will be achieved – not alone through greater medical care and increased health expenditures – but through a renewed national commitments to efforts designed to prevent disease and promote health".¹

Disease prevention and health promotion provide the main focus of the Healthy People program. Through 467 specific objectives arrived at through a various statistical methods and data gathering techniques, the program attempts to be a comprehensive survey of the health status and goals of the American populous. By listing the various behaviors and health indicators, the federal government provides detailed guidance and specific outcomes to state level programs aimed at solving local health problems. Funds arrive to the state levels through block grants that allow ample freedom to the state government to determine its use. For example, in Benton and Franklin counties in Washington state, the federal grants support efforts to prevent repeat pregnancies among teen mothers, pairing public health nurses with first-time teen mothers². In Mississippi, federal block grants were used to promote child passenger safety, purchase child car safety seats, distribute educational literature, and co-sponsor child safety seat checkpoints as well as to intensify awareness of stroke and hypertension (or high blood pressure), increase surveillance, and develop interventions³. The Preventative Health and Human Services block grants provide the significant bulk of this funding with a much smaller part coming from the maternal and child services grants. These grants allow for a more

¹ *Healthy People: The Surgeon General's Report on Disease Prevention and Health Promotion*; pg. 8

² <<http://www.doh.wa.gov/cfh/OHP/PHHSBlockGrant.htm>>

³ <http://www.msdh.state.ms.us/msdhsite/_static/44,0,133.html>

efficient use of federal dollars by allowing a more optimal distribution of funds to health problems needed.

A guiding principle of the Healthy People Program is the elimination of all health disparities among the numerous populations in America. The question of the *how* that is accomplished is determined on the local level through programs like those mentioned above and companion programs like Rural Healthy People 2010 that work to identify the problems as they exist on the ground level. PHHS block grants allow for the flexibility needed to discover and measure the problems that affect the different segments of the nation's population. The realization of the interconnectedness of the federal-state-local health agencies to the national health problem and an effort made to make these channels of communication as efficient as possible well help increase the effectiveness of the federal money in health promotion programs⁴

There is disagreement as to what constitutes disease prevention and health promotion. One of the more famous definitions of health comes from the constitution of the World Health Organization (WHO): "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Health in this sense is a term that includes many aspects of life than simply the absence of disease. Disease prevention aims at curing only the physical aspects of health, in this sense it is a subset of the idea of health. To help further understand the breadth of the idea of health, it helps to look at health as defined by Henry E. Sigerist:

"Health is promoted by providing a decent standard of living, good labor conditions, education, physical culture, means of rest and recreation. The coordinated efforts of large groups are needed to this end, of the statesman, labor, industry, or the educator and of the physician who as an expert in matters of health must define norms and set standards."⁵

Confusion arises when this rather expansive consideration of health is compared to the definition of health promotion stated in the 1979 Surgeon General's Report that established the Healthy People Program. He states in the beginning of the chapter on health promotion (Chapter 10):

"Medical care begins with the sick and seeks to keep them alive, make them well, or minimize their disability. Disease prevention begins with a threat to health – a disease or environmental hazard – and seeks to protect as many people as possible from the harmful consequences of that threat. Health promotion begins with people who are basically healthy and seeks the development of

⁴ See Elsa, William R., *Efficient Local-State-Federal Public Health Systems*. Journal of Public Health Policy, Vol. 3, No.3

⁵ Taken from an Editorial entitled *What is Health Promotion?* Journal of Public Health Policy, Vol. 7, No. 2

community and individual measures which can help them to develop lifestyles that can maintain and enhance the state of well being.”

These differing perceptions of health and health promotion add to the complexity of evaluating programs and initiatives aimed to positively affect the welfare of the nation. The lack of consensus surrounding the optimal breadth of federal interventions makes it difficult to quantify what changes must be observed in order to conclude that programs such as Healthy People 2010 are effective.

Objective of the Study

This project seeks to elucidate the association (if indeed there is one) between federal money spent on health promotion and disease prevention programs, on the one hand, and actual changes of behavior on the other. This inquiry is ambitious, so in order to avoid confusion and maintain focus, our group decided upon four focus areas; type II diabetes, heart disease (not including stroke), cervical cancer, and arthritis. To clearly define and track a particular money trail, we followed the distribution of PHHS block grants given to various states and the programs these states initiated with the money.

II. Literature Review

Studies Linking Spending to Outcomes

No study in recent academic journals and trade literature discusses the returns to investment of federal health care programs like Healthy People 2010. Many describe the programs already set up and initiatives; and, few actually urge further studies that would pursue an idea of return on the money spent on health programs.

A recent study from the Wood Johnson Foundation comes close in terms of what we are looking at in this analysis.⁶ The study looks at per capita spending for public health by one of the DHHS agencies – the Centers of Disease Control (CDC) - and the differences between the distribution and allocation of money in the states. The Wood Johnson foundation study covers spending on public health of which health promotion and disease prevention are only a part.

The PHHS block grants aimed at promotion and prevention efforts are only part of the CDC funding. The PHHS block grants are given to states and local communities with the stipulation that they support general prevention efforts and respond to emerging health threats. They may also be used to prevent leading causes of disease and death. For many programs, the PHHS grants are the only government funding they receive. Therefore, not only is the Wood Johnson Foundation study broader in scope than our analysis, but the findings are only descriptive. It does not link federal health spending in PHHS grants to changes in individual behavior. It seems that the more quantitative approach is the next step that the authors think should be taken. One of the study's recommendations states: "Americans deserve to know how effectively their money is being used. An ongoing system of measurement must be developed to review the relationship between how dollars are spent and the impact on people's health".

As expected, there is a broad array of studies that show the direct link between individual behavior and health. Chronic diseases like type I and type II diabetes and some cancers are largely the result of behavioral factors. While genetics and exposure to environmental toxins can also influence the development of chronic diseases, behavior is the primary contributor to chronic diseases for most people.

Scientists and health practitioners have long perceived a connection between diet and health. Findings from an epidemiologic study suggest a beneficial effect of whole-grain, fruit, and vegetable consumption on the risks of total mortality and the incidence of the coronary artery disease (CAD)⁷. This study analyzed the relations of whole-grain, refined-grain, and fruit and vegetable intakes with the risk of total mortality and the

⁶ *Shortchanging America's Health 2006. A state-by-state look at how federal public health dollars are spent*, Trust for America's Health, June 2006

⁷ Lyn M Steffen, David R Jacobs Jr, June Stevens, Eyal Shahar, Teresa Carithers, and Aaron R Folsom, *Associations of whole-grain, refined-grain, and fruit and vegetable consumption with risks of all-cause mortality and incident coronary artery disease and ischemic stroke: the Atherosclerosis Risk in Communities (ARIC) Study* 1–3, *American Journal of Clinical Nutrition* 2003;78:p. 383–90.

incidence of coronary artery disease and ischemic stroke among 45-64 years old cohort. Over the 11-year follow-up period, whole-grain intake was inversely associated with total mortality and the incidence of CAD whereas the intake of fruit and vegetables was inversely associated with total mortality. An inverse association between fruit and vegetable intake and CAD was observed among African Americans but not among whites. Refined-grain intake was positively related to the incidence of CAD in the African Americans but not in the whites.

The results of a 23-year follow-up of high risk men age 40-49 who were randomly assigned to either a lifestyle intervention group or a control group for five years in the Oslo Diet and Antismoking Trial show that the advice to change diet and smoking habits reduced the relative risk of ischemic heart disease (IHD) mortality after 23 years in men with high triglyceride concentrations (“fat” in the bloodstream). Men with normal triglyceride concentrations did not appear to achieve this long-term benefit of lifestyle intervention. The results follow from the fact that men with high triglyceride levels are often overweight, and dietary changes may reduce body weight in this subgroup⁸.

A European study focused on the question how cost effective are diet change strategies compared to other measures aimed at reducing cardiovascular disease (CVD) in EU member states⁹. If they are more cost-effective, the potential health gains from implementing policies based on EU food based dietary guidelines will be substantial. The results showed that health protection strategies which promote healthy eating are likely to be more cost-effective than strategies involving modern cholesterol-lowering drugs, screening and advice in primary care, and are comparable to or less expensive per year of life saved than anti-smoking strategies. Specifically, the study found the estimates of cost per life year gained for population-wide healthy eating promotion of £14 ± £560. These estimates are favorable in comparison with those for smoking interventions (around £500), and superior to all other forms of prevention, including health screening (at least £900) and modern cholesterol-lowering drugs (£8200).

Contrary to the results from Europe are those from the United States. The results tend to point to the relative inefficiency (i.e. cost-effectiveness) of government programs when we analyze the government spending on health promotion. One study examined the influence of national nutrition campaigns on food purchasing behavior of Americans between 1982 and 1993 as revealed by the total home food dollars spent on certain items¹⁰. The goal was to see if Americans increased purchases of foods lower on the USDA Food Guide Pyramid (grains, fruits and vegetables) and decreased purchases of items higher on the pyramid (meat, poultry, fish, sugary foods and fats). The results show that overall purchasing trends were not greatly impacted by the national nutrition

⁸ *Dietary and antismoking advice and ischemic heart disease mortality in men with normal or high fasting triacylglycerol concentrations: a 23-y follow-up study*, Ingrid Ellingsen, Ingvar Hjermmann, Michael Abdelnoor, Elsa M Hjerkmann, Serena Tonstad, *American Journal of Clinical Nutrition* 2003;78:p. 935–40.

⁹ Brunner,E., Cohen,D., Toon,L., *Cost effectiveness of cardiovascular disease prevention strategies: a perspective on EU food based dietary guidelines*, *Public Health Nutrition* 4(2B), p. 711-715, 2001

¹⁰ T. G. Chavez, W. D. Hart, M. K. Mattfeldt-Beman *National Nutrition Campaigns: Are they Making a Difference in Americans' Food Purchasing Behavior?*

campaigns and dietary recommendations released between 1982 and 1993. The exceptions to this were beef and shell egg purchases, whose declines were likely impacted by the efforts of the National Cholesterol Education Program. Low fruit and vegetable purchases would correlate with a less than desirable intake of nutrients from foods. Though high fat dairy products showed a significant decrease in purchases, USDA data indicated that declines in whole milk consumption were offset by rapidly rising cheese consumption. One of the biggest concerns based on the study's findings is the rising trend in purchase of fats, high fat grain products (cookies, cakes, donuts) and sweets (ice cream, candy, carbonated beverages). These trends likely offset any decrease in total and saturated fat consumption from beef, shell egg and whole milk.

Studies Linking Behaviors to Prevention

Strategies that improve nutrition and increase physical activity are fundamental to the control of the epidemic of obesity. Because of the belief that diets rich in fiber are generally low in saturated fat, many national authorities have long recommended greater consumption of grain products to control weight. Research shows that increased consumption of dietary fiber and grain products is beneficial not only to maintaining the healthy body weight but also to long-term weight changes. Weight gain is inversely associated with the intake of high-fiber, whole-grain foods but positively related to the intake of refined-grain foods. This inverse association indicates the importance of distinguishing whole-grain products from refined-grain products to aid in weight control.¹¹

A randomized intervention study comparing low fat diets to normal fat diets showed that low fat diets prevent weight gain in normal weight subjects and produce weight loss in overweight individuals¹². The goal of the study was to determine the role dietary fats played in a person's weight gain and development of obesity. The analysis of low fat interventions included 16 trials involving 1728 individuals. The difference in weight loss between intervention and control groups was 2.5 kg. Extrapolated to a body mass index (BMI) approximately 30 kg/m, and assuming a 10% reduction in dietary fat, the predicted weight loss would be 4.4 kg, which has been confirmed in subsequent studies. Newer studies have shown that replacing some carbohydrate with protein may enhance weight loss. The authors of these studies observe that obesity prevalence is increasing despite a slight decrease in population dietary fat consumption. Decreasing physical activity, which reduces the body's daily fat intake requirements, might be the cause of this occurrence, also known as the American Paradox.

¹¹ Simin Liu, Walter C Willett, JoAnn E Manson, Frank B Hu, Bernard Rosner, and Graham Colditz, *Relation between changes in intakes of dietary fiber and grain products and changes in weight and development of obesity among middle-aged women*, American Journal of Clinical Nutrition, 78: p. 920 –7, 2003

¹² Astrup A., *The role of dietary fat in prevention and treatment of obesity. Efficacy and safety of low-fat diets*, International Journal of Obesity Related Metabolism Disorders, May 2001, Suppl 25, p. 46-50

A British group has undertaken a systematic review of the long-term effects of obesity treatments on body weight, risk factor development, and disease¹³. The results show that low-fat diets were associated with continuing weight loss for three years, less chance of developing risk factors, as well as an increased prevention of type II diabetes and improved control of hypertension. Insufficient evidence was available to demonstrate the benefits of low calorie or very low calorie diets. The addition of an exercise or behavior program to diet was associated with improved weight loss and risk factors for at least 1 year. Studies combining low-fat diets, exercise and behavior therapy suggested improved hypertension and cardiovascular disease.

Current public health recommendations for physical activity are for 30 minutes of moderate-intensity activity per day, which provides substantial benefits across a broad range of health outcomes for sedentary adults¹⁴. This dose of exercise may be insufficient to prevent unhealthful weight gain for some, perhaps many, but probably not all, persons. The Institute of Medicine panel's conclusion is that 30 minutes a day is insufficient for most persons to maintain body weight in the desirable BMI range (from 18.5 to 25 kg/m). The equivalent of 60 min of accumulated physical activity each day is required for most persons to prevent undesirable body fat accretion and to provide additional health benefits¹⁵. In addition to aerobic exercise, it is desirable that people engage in activities that build musculoskeletal fitness, such as resistance training and flexibility exercises, at least twice a week. These additional exercises will promote maintenance of lean body mass, improvements in muscular strength and endurance, and preservation of function, all of which enable long-term participation in regular physical activity and promote quality of life.

Some of the health benefits of exercise include weight loss, improved control of blood glucose and insulin in diabetes, prevention of osteoporosis, and reduced risk of cardiovascular disease and cancer. A beneficial role of exercise in women's health is well accepted. One type of arthritis, rheumatoid arthritis (RA) is an autoimmune inflammatory disease believed to affect approximately 1% of the population; most of those affected are women. Several studies conducted over the past years have clearly demonstrated that RA patients who participate in regular programs of aerobic exercise gain significantly in a variety of ways as compared to control groups with no adverse effects on joints¹⁶. Physical benefits include improvements in muscle strength and joint flexibility, increased

¹³ Avenell A, Broom J, Brown TJ, Poobalan A, Aucott L, Stearns SC, Smith WC, Jung RT, Campbell MK, Grant AM, *Systematic review of long-term effects and economic consequences of treatments for obesity and implications for health improvement*, Health Technology Assessment, May 2004, 8(21), iii-iv, p. 1-182

¹⁴ Steven N Blair, Michael J LaMonte, and Milton Z Nichaman, *The evolution of physical activity recommendations: how much is enough?*, American Journal of Clinical Nutrition 2004;79(suppl):p. 913–20.

¹⁵ George A Brooks, Nancy F Butte, William M Rand, Jean-Pierre Flatt, and Benjamin Caballer, *Chronicle of the Institute of Medicine physical activity recommendation: how a physical activity recommendation came to be among dietary recommendations*, American Journal of Clinical Nutrition 2004;79(suppl):p. 921–30.

¹⁶ Patricia A. Deuster, *Exercise in the Prevention and Treatment of Chronic Disorders*, Women's Health Issues, Vol. 6, No. 6, November/December 1996

aerobic capacity, and less morning stiffness; psychological benefits included better self-esteem and less anxiety and depression. Improvements have been documented with water-based exercises, as both observational and controlled trials have documented the safety and efficacy of aerobic exercise in a water environment for persons with arthritis.

III. Focus Areas

The Healthy People initiative is a national blueprint for health promotion and disease prevention. Through this program, the federal government attempts to communicate to the public (through programs identified by state governments) what is harmful, harmless and helpful to a person's health. All of which present a substantial challenge because of the difficulty in persuading people to change their behavior and the lifestyle.

When we think about prevention we can consider three different levels: primary, secondary, and tertiary. Primary prevention is aimed at reducing the incidence of disease and other departures from good health. It includes doctor's visits, vaccinations, proper diet and exercise. Secondary prevention aims to detect the disease early and to reduce the impact of the disease and its prevalence (e.g. being obese and adopting lifestyle changes to prevent the onset of diabetes). Tertiary prevention is aimed at reducing complications. This includes, among other things, actual interventions like physical therapy and surgery.

To focus our investigation, we decided to narrow in on prevalence rates of four of the leading causes of death and disability in the U.S. as useful guides in describing the health status of the Americans; and therefore, disease prevention efforts. The four diseases are: 1) heart disease, 2) diabetes, 3) cervical cancer, and 4) arthritis. These four diseases account for a significant portion of federal spending on health promotion and disease promotion. Moreover, changes in individual behavior can either help prevent these diseases or reduce their severity.

Diabetes

More than 200,000 diabetes-related deaths occur per year, and the total annual direct and indirect societal costs of the disease are estimated at about \$100 billion¹⁷. The underlying pathology of diabetes is very complex and involves multiple body organs. The disease drastically alters the body's metabolism. At the core of this disorder is the hormone insulin. The pancreas produces insulin, a hormone that allows glucose (sugar) to enter cells where it can be metabolized.

Type I diabetes is an autoimmune disorder where the cells in the pancreas are destroyed in early childhood. Because their bodies are no longer able to produce insulin, children are dependent on insulin shots to control their blood sugar levels.

Type II diabetes is caused by insulin resistance. The body is able to make insulin, however the body's tissues are unable to respond to normal amounts of insulin.

¹⁷ Data Source: National Center for Health Statistics,
<http://www.healthypeople.gov/Data/2010prog/focus05/>

Eventually the body is unable to increase its insulin production, and in the face of increasing insulin resistance, blood sugar levels increase. Type II diabetes was first described in Canadian First Nation children (who are considered ethnically comparable with American Indians) in the mid-1980s. In the mid-1990s it became apparent that type II diabetes also affects adolescent (or younger) African Americans, Hispanic Americans, and, more recently, Asian Americans in greater percentages than found among white Americans.

Diabetes, both Type I and Type II, results in increased blood sugar levels, but the end result occurs through very different mechanisms. The exact mechanism of insulin resistance is not well understood; however, professional opinion relates this mechanism to obesity. Research shows that overweight children and adolescents are at an increased risk of developing diabetes, high cholesterol and other weight-related health problems. Diabetes sufferers also possess a higher risk of developing coronary artery disease, heart attack, blindness, kidney failure, infection, and cardiovascular disease. Diabetes increases cardiovascular disease risk by two to four times and often is associated with other cardiovascular risk factors, such as high blood pressure and cholesterol disorders. Although short-term weight loss has been shown to ameliorate obesity-related metabolic abnormalities and cardiovascular disease risk factors, the long-term consequences of intentional weight loss in overweight or obese individuals with type II diabetes have not been adequately examined.

Certain individual behaviors are essential in the proper preventive management of diabetes. Smoking cessation, use of aspirin, and self-blood-glucose-monitoring are representative of individual behaviors that should be periodically monitored. Aspirin therapy in persons with diabetes - especially in the presence of other cardiovascular risk factors, such as high blood pressure, elevated blood lipids, etc.—has been demonstrated to reduce the likelihood of a future heart attack or stroke.

Arthritis

Arthritis is a disease of the joints. There are a variety of diseases and syndromes, which damage the joints, and the underlying mechanisms are very diverse. There are more than 100 different types of arthritis and the cause of most types is unknown. Arthritis is one of the most prevalent chronic health problems and the nation's leading cause of disability among Americans over age 15. It is second only to heart disease as a cause of work disability. The total costs of arthritis and other rheumatic conditions in the United States are 86.2 billion dollars annually¹⁸. Arthritis affects a wide range of individuals, from the very young to the very old. An estimated 46 million adults (21

¹⁸ Data Source: Arthritis Foundation, <http://www.arthritis.org/resources/gettingstarted/default.asp>

percent) in the United States reported being told by a doctor that they have some form of arthritis¹⁹.

More research is needed so that new therapies are able to successfully target the underlying mechanism of the disease. Scientists are currently studying what roles three major factors play in certain types of arthritis. These include the genetic factors people inherit from their parents, what happens to people during the life and how people live. In terms of the lifestyle, the desired changes in the individual behavior include: proper exercising routine such as walking, proper diet and nutrition, and losing weight.

Research has shown several connections between food, nutritional supplements (vitamins, minerals and omega-3 fatty acids) and certain forms of arthritis. Being overweight increases the risk of developing arthritis. In general, people who are more than 10 pounds overweight have a higher risk for arthritis, especially in weight-bearing joints like the knees. Increased weight puts significantly more pressure on joints, causing cartilage (the cushioning layer between bones in a joint) to break down faster than usual. The percentage of cases of arthritis linked directly to obesity has risen from 3 percent in 1971 to 18 percent in 2002. In 1971, obese people were approximately 20 percent more likely to develop arthritis than those who were not overweight. In 2002, 66 percent of adults with doctor-diagnosed arthritis were overweight or obese²⁰.

Persons with arthritis can participate in regular physical conditioning programs. Participation in such programs can significantly improve cardiovascular health and fitness, muscle strength and endurance, flexibility, function, and psychological status. The final answer on clinical improvements will require further study and may depend on: the severity of the disease; the mode, frequency, intensity, and duration of the exercise; the biochemical profile of the patient; the compliance of the patient; and the duration of the disease.

Cervical Cancer

The cervix is the lower part of the uterus that connects to the vagina. Cancer developed in this region ranks second in prevalence among cancers in women (colorectal cancer are virtually tied for behind breast cancer). Half of all females diagnosed with cervical cancer are between 35 and 55 years of age. Race seems to play a role in chances of developing cervical cancer. Hispanic women suffer in numbers twice that of Caucasian women and African American women develop this cancer at about one and a half times the rate that Caucasian women do. In 2006, the American Cancer Society (ACS)

¹⁹ Data Source: NHIS 2003–2005, http://www.cdc.gov/arthritis/data_statistics/arthritis_related_statistics.htm#4

²⁰ Data Source: NHIS 2002, http://www.cdc.gov/arthritis/data_statistics/arthritis_related_statistics.htm#4

estimates there will be about 9,710 new cases of cervical cancer diagnosed in the United States, and that about 3,700 women will die from the disease²¹.

Cervical cancer is commonly caused by certain types of a common virus, human papilloma virus (HPV) that is found in 50% of cervical cancers. However, many of these women may not realize that they were probably exposed to one of the “high-risk” types of HPV during their teens and 20s. HPV is most common in young women and men who are in their late teens and early 20s. Women and men engaging in sexual activity involving genital contact with someone carrying HPV risk catching the disease. HPV can spread between people without intercourse. And, because many people who have the virus may not show any signs or symptoms, they can transmit the virus without even knowing it. In fact, it is estimated that many people get HPV within their first 2 to 3 years of becoming sexually active. At least 50% of sexually active people will get HPV at some time in their lives. Every year in the United States (U.S.), about 6.2 million people get HPV.²²

Ways to decrease your chances of getting genital HPV are: 1) limiting your sexual partners, 2) staying in a long-term, exclusive relationship with someone who doesn't have HPV, 3) using a condom—though it's unknown how much protection condoms actually provide, and 4) an experimental vaccine (Gardasil, which has been recently approved by the FDA) can prevent women from becoming persistently infected with the virus. Medical evidence supporting its efficacy should convince insurers and government programs that pay for vaccinations in children under 18 to partially cover its costs. Gardasil is being recommended for girls when they are 11 or 12, before they become sexually active. It is also recommended as a “catch up” for women aged 13 to 26, even if they have been sexually active. The vaccine requires a series of 3 injections over a one-year period, which will cost around \$360.²³

Pap tests are the primary method used to detect cervical cancer. Also known as a Pap smear, a Pap test is part of a gynecological exam. It helps detect abnormal cells in the cervix before they turn into cancer. Pap tests can also detect most, but not all, cervical cancers at an early, curable stage. Most women diagnosed with cervical cancer in the U.S. have either never had a Pap test, or have not had a Pap test in the last 5 years.

Heart Disease

Coronary artery disease (CAD) affects almost 13 million Americans, making it the most common form of heart disease. It is also the leading cause of death in the U.S.²⁴

²¹ American Cancer Society,

http://www.cancer.org/docroot/CRI/content/CRI_2_4_1X_What_are_the_key_statistics_for_cervical_cancer_8.asp?rnav=cri

²² http://www.cancer.org/docroot/CRI/content/CRI_2_6x_FAQ_HP_Vaccines.asp

²³ http://www.cancer.org/docroot/CRI/content/CRI_2_4_2X_Can_cervical_cancer_be_prevented_8.asp

²⁴ <http://texasheart.org/HIC/Topics/Cond/CoronaryArteryDisease.cfm>

In this disease, cholesterol plaques form in the coronary arteries supplying the heart. When these plaques rupture, a clot can form, compromising blood supply to the heart, leading to a heart attack. Predisposing factors are high-cholesterol, diabetes and smoking. Cholesterol can be both good and bad, so it's important to learn what cholesterol is, how it affects our health and how to manage our blood cholesterol levels. Understanding the facts about cholesterol can help take better care of the heart and live a healthier life, reducing the risk for heart attack and stroke. To control cholesterol, people should get a cholesterol screening, eat food low in saturated fat and cholesterol, maintain a healthy weight, exercise regularly and follow physician's recommendations.

A healthy diet and lifestyle are also key weapons to prevent cardiovascular diseases according to new American Heart Association (AHA) diet and lifestyle recommendations²⁵. Intended for healthy Americans age 2 and older, the recommendations, which replace guidelines issued in 2000, now recommend: further reducing saturated and trans fatty acids in the diet; minimizing the intake of food and beverages with added sugars; emphasizing physical activity and weight control; eating a diet rich in vegetables, fruits and whole-grain foods; avoiding use of and exposure to tobacco products; and achieving and maintaining healthy cholesterol, blood pressure and blood glucose levels. The new recommendations address a key challenge faced by increasing numbers of Americans: maintaining a healthy dietary pattern while eating more foods prepared outside the home. Another major change in the dietary recommendations is a lower goal for saturated fat — from less than 10 percent to less than 7 percent — and establishing a goal for trans fatty acids of less than 1 percent of total calories. The association urges industry to gradually reduce the salt and sugar content of processed foods and to increase the proportion of whole grains compared to white flour in baked goods, among others.

²⁵ <http://www.americanheart.org/presenter.jhtml?identifier=3040209>

IV. Data and Statistical Methods

Data Sources

1) DATA2010:

One of the sources that was used to compile behavioral data and health statistics is DATA2010. DATA2010 is an interactive database system developed by staff of the division of Health Promotion Statistics of the National Center for Health Statistics. According to the website, the database contains the most recent monitoring data for tracking Healthy People 2010. Data are included for all the objectives and subgroups identified in Healthy People 2010: Objectives for Improving Health.

DATA 2010 is updated quarterly. DATA2010 is the only authoritative source for Healthy People 2010 data. The Centers for Disease Control and Prevention's Wonder data system is a host for the data set.

2) Behavioral Risk Factor Surveillance System:

The other source of data that was used is the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is the world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984. Conducted by the 50 state health departments as well as those in the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands with support from the CDC, BRFSS provides state-specific information about issues such as asthma, diabetes, health care access, alcohol use, hypertension, obesity, cancer screening, nutrition and physical activity, tobacco use, and more.

Spending Variables

In analyzing federal spending on efforts designed to assist in the nation's achievement of the objectives of Healthy People 2010, it is possible to include a number of diverse programs housed within the Department of Agriculture, the Department of Health and Human Services, etc. This analysis focuses solely upon The Department of Health and Human Services' spending on health promotion and disease prevention. This decision rests upon the assumption that the efforts of Health and Human Services are more directly related to the objectives of Healthy People 2010 than those of the other Departments and Councils involved with the Healthy People framework design and tracking.

In examining whether federal spending is associated with real changes in behavior, the selection of a spending variable for which sufficient data is available is crucial. One potential method of evaluation is a direct comparison of total federal spending supporting health promotion and disease prevention nationally to changes in behavior that are representative of the nation's population as a whole. This type of correlational analysis may reveal broad trends of pertinence to this study's research question; however, the potential for these results to be sufficient basis for the formulation

of conclusions is limited by the fact that it involves a relatively small sample (consisting of only one observation for federal spending and each behavioral indicator variable of interest for each of the five years analyzed). A sample size of five is severely restrictive, thus, any type of statistical analysis examining changes in funding and behavioral indicators on a national level over the five-year time period selected for this study is not likely to yield very conclusive, or substantively important, results.

Because precision of results is critical to fully addressing the research question driving this study, it is necessary to identify a federal funding stream that can be decomposed into smaller units and that varies in its value over the five-year time frame considered in this analysis. These characteristics of the ideal spending variable are important because they provide for the incorporation of a greater degree of variation in the data, and this variation increases the level of reliability associated with the results of any statistical analysis performed. Another characteristic of the desired spending variable is a strong and immediate link to health promotion and disease prevention efforts. When working with line item values from the budgets of federal departments and agencies, it is not entirely apparent whether these dollars are devoted strictly to the types of programs and initiatives of interest to this study.

With these aforementioned concerns in mind, the Preventive Health and Health Services Block Grant was selected as the exclusive federal spending variable included in the regression analysis component of this study. Because it is a block grant, its annual appropriation value in the CDC budget is decomposable to the state level, thus providing, ideally, fifty observations for each year considered. The Healthy People 2010 Guide to Identifying and Securing Resources specifically mentions the PHHS block grant as a principle source of funding for state-level health promotion and disease prevention efforts.

The Preventive Health and Health Services Block Grant

Congress authorized the Preventive Health and Health Services Block Grant in 1981 as a means of providing federal funding to address the specific and unique health concerns of each state. The PHHS Block Grant currently serves as the primary source of flexible funding available to states to pursue efforts that advance any of the 467 national health objectives designated in the Healthy People 2010 health improvement plan.

States invest their PHHS Block Grant dollars in a number of public health areas. These dollars may supplement funding for states' existing programs; they may fund the implementation of new programs, or may be used to respond to unforeseen health challenges arising from emergency situations. Examples of specific services supported by this funding include: workforce training, public education, outbreak control, preventive screening, clinical services, cardiovascular disease programs, etc. Because states are allowed such a high degree of autonomy in determining how their PHHS funds are

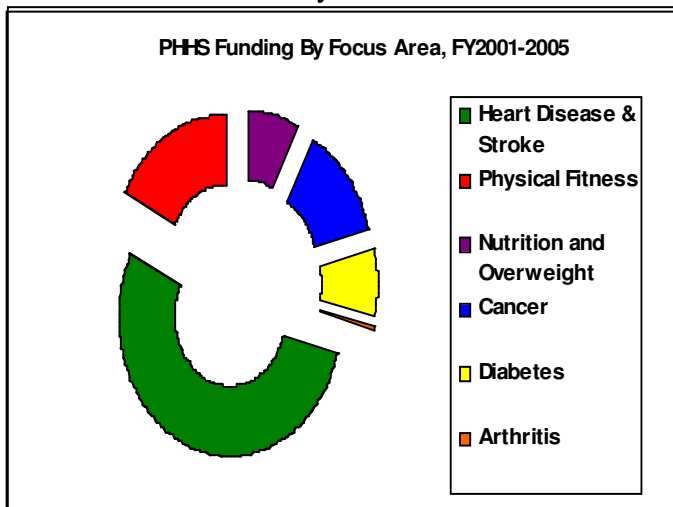
invested, no two states have identical allocations of their block grant resources, and no two states provide identical funding to the same type of program or activity.

Table 1A: PHHS Block Grant Allocations By Focus Area and Year

Preventive Health and Health Services Block Grant, FY 2001-2005 Chronic Disease/Health Promotion Funding, By Area						
Year	Heart Disease & Stroke	Physical Fitness	Nutrition and Overweight	Cancer	Diabetes	Arthritis
2005	\$13,174,110	\$5,673,314	\$3,576,347	\$2,237,454	\$2,709,417	\$325,698
2004	\$13,210,717	\$7,016,543	\$4,625,378	\$3,013,029	\$2,187,103	\$316,024
2003	\$15,017,843	\$5,441,147	\$3,692,710	\$3,690,450	\$2,269,791	\$182,557
2002	\$15,085,553	\$9,240,724		\$4,527,923	\$2,644,244	\$196,095
2001	\$26,294,144			\$6,635,029	\$2,157,970	
Cumulative	\$82,782,367	\$27,371,728	\$11,894,435	\$20,103,885	\$11,968,525	\$1,020,374

Table 1A and Figure 1A illustrate the total PHHS dollars allocated to the particular health areas targeted in this study over the 2001-2005 time period. While more PHHS dollars have been invested in programs and initiatives related to heart disease and stroke than any other focus area, this value has declined significantly over the time period considered. This trend is suggestive of two independent, but not necessarily mutually exclusive, underlying factors. This high level of funding may be in reaction to a high prevalence of heart disease and stroke, or it may represent a health policy priority of the states.

Total spending on heart disease and stroke over the 2001-2005 time period is nearly three times that of physical fitness, the next highest funded focus area. Arthritis and diabetes are the only two focus areas that have experienced increases in funding over this period; however, these gains have been relatively modest. As illustrated in Figure 1A, total funding for arthritis is significantly smaller than any other focus area, representing just 1/80th of the funding for heart disease and stroke over this period, and roughly 1/10th of the funding devoted to diabetes, the second smallest focus area.



The President’s Budget for fiscal year 2006 proposed elimination of the PHHS Block Grant. Because the PHHS Block Grant supplies a critical source of funding for responding to state-specific health needs when other funding is insufficient or entirely nonexistent, there was a significant backlash by community-level health departments, state governments, representatives, and national health organizations in reaction to this proposal. Many of these stakeholders conducted impact studies assessing the degree to which communities would be affected by this loss of flexible funding. The Directors of Health Promotion and Education, (in conjunction with the Chronic Disease Directors, a membership organization of state public health officials), compiled the information in Table 1B as part of a report submitted to Congress in support of restoring appropriations for the PHHS. This table illustrates these organizations’ estimated impact of elimination of the PHHS upon state public health efforts relevant to health promotion and disease prevention. Values in red pertain to the focus areas of this study.

Table 1B: Estimated Impact of Elimination of PHHSBG upon State Health Promotion and Disease Prevention Efforts

Chronic Disease/Risk Factor Program Area	# of States	Total Funding Amount	Lives Impacted
Cardiovascular	21	\$15,927,974	54,994,543
Healthy Cities and Communities	34	\$13,853,750	142609061
Cancer	14	\$2,626,586	49,125,904
Diabetes	8	\$1,432,835	7,529,620
Other Chronic Diseases	10	\$2,206,518	26,863,389
Arthritis	2	\$116,312	2,538,500
Asthma	2	\$309,283	5,657,617
Injury Prevention	23	\$6,147,722	81,698,043
Oral Health – Water Fluoridation	18	\$2,582,513	48,008,516
Community Preventive Services – Physical Activity, Nutrition, Tobacco, Obesity	16	\$7,025,366	154,425,221
Worksite Wellness and Risk Reduction	9	\$1,974,818	12,982,454
Chronic Disease/Risk Factors totals		\$54,203,677	

*DHPE, 2005

In response to the overwhelming outpouring of support for the PHHS block grant, the House Labor, Health and Human Services and Education Subcommittee restored funding of the PHHS Block Grant for FY2006, though funding levels were slightly lower than FY2005. Despite this deliberate action taken by Congress to keep the grant in operation, the President’s budget for FY2007, again, proposed PHHS block grant elimination.

Behavior Variables:

1) Health Status

The Behavioral Risk Factor Surveillance System (BRFSS) includes a self-reported measure for health status. When respondents were surveyed concerning their health status, they were asked to choose whether “excellent”, “good”, “fair”, or “poor” best described their overall health status. Two groups were then formed: one for those who answered good or excellent health and another for people who reported fair or poor health.

The BRFSS tracks the data for health status in their database. We have data for each state in every year from 2000 to 2005. Between 2000 and 2005, only ten states had an increase in the number of respondents that reported being in "good or better" health. However, it should be noted that the percentage of people within a state that report being in good health is relatively high. In 2000 the average was 85.5% and in 2005 the average was 84.3%. While this is a decrease, it can still be argued that having over 84% of your population report that they are in good health is still a desirable outcome.

The states with the largest increase in the measure of health status were Rhode Island and Connecticut. Both of these states had a nominal increase of 1.6 percentage points. The state with the largest decline in the health status measure is Louisiana. In nominal terms, the state experienced a decline of 4.9 percentage points, and a real percentage decline of over 5.8%. In 2005, the state with the lowest level of health status was West Virginia with 75.3%. The state with the highest level of health status was New Hampshire with 88.9%

2) Fruit and Vegetable Intake:

CDC research shows that healthy diets rich in fruits and vegetables may reduce the risk of cancer and other chronic diseases. Fruits and vegetables also provide essential vitamins and minerals, fiber, and other substances that are important for good health. Most fruits and vegetables are naturally low in fat and calories and are filling, which can consequently lead to a decrease in weight. Studies show that if a person is overweight or obese, reducing body weight by as little as 5 percent to 10 percent can have significant benefits on one’s health. The FDA recommends that people should eat at least five servings of fruit and vegetables per day.

Data2010 tracks both fruit and vegetable intake for adults. However, the information available was not complete and we used data from the BRFSS. The BRFSS compiled data on the number of adults who consumed fruits and vegetables five or more times per day.

For this indicator, we have data for all states for three years: 2002, 2003, 2005. Between 2002 and 2005, half of the states (25 & DC) saw an improvement in the population who ate the recommended number of servings of fruit and vegetables each

day. The national average for this measure in 2002 was 23.5%. In 2005, the average increased to 23.61%. This represents a real percentage gain of 0.48%. The state with the biggest increase in this time period was Hawaii, from 20.4% to 24.5%. The state with the largest decrease was Kentucky, from 20.2% to 16.8%.

In 2005, DC was the area that had the most people consuming the recommended number of fruits and vegetables each day with 32.3%. The state with the lowest percentage was Oklahoma with 15.7%. Since even the best state has less than a third of the population eating the recommended amounts, it is clear that much more needs to be done to encourage this healthy behavior.

3) Physical Activity:

Along with a healthy diet, physical activity plays an important role in the prevention of overweight and obesity (USDHHS, 2001). In order to maintain a stable weight, a person needs to expend the same amount of calories as he or she consumes. Although the body burns calories for everyday functions such as breathing, digestion, and routine daily activities, many people consume more calories than they need for these functions each day. A good way to burn off extra calories and prevent weight gain is to engage in regular physical activity beyond routine activities.

For this variable, data from the BRFSS was used in our analysis. Information was available from all states for two years: 2003 and 2005. An appropriate level of physical activity was determined to be either 30 minutes of moderate exercise five days a week or 20 minutes of vigorous exercise three times a week and the BRFSS tracked the percentage of population who met this recommended level.

Overall, changes in the level of physical activity displayed the largest positive outcomes. The national average increased from 47.9% in 2003 to 49% in 2005; a gain of 1.1 percentage points and a real percentage gain of 2.3%. During this time period, the state that experienced the largest positive increase was California, which experienced a gain in the percentage of people partaking in this behavior from 46.7% to 53.4%. This translates to a real gain of over 14.3%. The state with the largest decrease was West Virginia, which dropped from 42.7% to 39.4%.

Surprisingly, the state with the highest percentage of people in 2005 who receive the recommended amount of physical activity is Alaska with 59.2%. The lowest level of physical activity is found in Kentucky with 34.7%.

4) Pap Tests:

Cervical cancer is preventable and curable if it is detected early. Pap tests, also known as Pap smears, can detect precancerous cervical lesions at early, treatable stages. Regular Pap tests are recommended as a way to decrease a woman's risk for developing cervical cancer. The USPSTF currently recommends cervical cancer screening at least every three years, beginning at the age of 21 or three years after the onset of sexual

activity, whichever comes first. Nonetheless, approximately half of U.S. women who develop cervical cancer have never had a Pap test.

DATA2010 has information available on the percentage of women who have received a pap test within the last three years. We have complete data for each state for the years 2000, 2002, and 2004. We also have incomplete data for 2001 and 2003.

Between 2000 and 2004, the majority of states experienced a decrease in the number of women receiving their pap tests. During this time period, the national average decreased from 84% to 82.4%. As in the case of health status, these numbers can be misleading. While still below the target and much room for improvement still exists, over 80% of women in the U.S. are receiving the test.

The biggest increase in the percentage of women receiving the Pap test was in Wyoming, from 78% to 82%. The biggest decreases were seen in Utah and Oklahoma, both dropping by five percentage points. The state with the highest percentage of women receiving the test was in DC, where 87% of women have had a pap test in the last three years. The states tied with the lowest percentage of women receiving the test were Idaho and Utah, where only 74% of women had the test in the last three years.

Statistical Methods

This study employs a combination of qualitative and quantitative analysis techniques which utilize historical PHHS data and selected behavioral indicator variables to address the question of whether federal spending on health promotion and disease prevention is associated with observable changes in behavior. The goal of the more qualitatively focused comparative state analysis is to identify broad associations, while the data-intensive regression analysis aims to provide evidence of more specific and isolated effects.

To investigate the existence (and magnitude) of an effect of federal spending upon changes in behavior, both linear regression and binary response regression models have been utilized. These models allow for an isolation of the effect of federal spending from other potential effects on behavior that are attributable to population characteristics such as age, education, and income. The two types of models selected in this analysis, ordinary least squares regression (OLS) and probit regression, yield estimates of two slightly different, but equally interesting, effects. The linear regression models allow for estimation of the expected change in behavior associated with each federal dollar spent on health promotion and disease prevention. In contrast, the binary response models yield estimates of the effect each dollar of federal spending has upon the likelihood that a positive change in behavior occurs.

OLS Regressions

Identically specified ordinary least squares regression models are estimated for each of the four behavioral indicator variables: 1) self-reported health status, 2) fruit and vegetable consumption, 3) regular physical activity, and 4) whether a woman has

received a pap test in the past three years. The dependent variable specified in these models is the percentage change in each state's behavioral indicator variable over the 2000-2005 time period. The spending variables included are the total PHHS dollars received by each state in the years 2000, 2004, and 2005. In order to control for characteristics of each state's population that may be relevant to health, and that may, potentially, account for differences in the behavioral indicator variables across states, demographic variables for each state were included as explanatory variables in the regression models. This data comes from the Census Bureau, and includes the median income, the median age, and the percent of citizens holding a college degree or higher for each state.

Probit Regressions

Identically specified probit regression models are also estimated for each of the four behavioral indicator variables: 1) self-reported health status, 2) fruit and vegetable consumption, 3) regular physical activity, and 4) whether a woman has received a pap test in the past three years. The dependent variable specified in these models is different than that of the OLS models. Instead of the percentage change in each state's behavioral indicator variable over the 2000-2005 time period, it is a dummy variable indicating whether the state saw improvements in the behavioral indicator. The spending variables included are the total PHHS dollars received by each state in the years 2000, 2004, and 2005. The same control demographic variables were included as explanatory variables in these models as were used in the OLS regressions.

V. Analysis and Discussion

Descriptive Statistics and Qualitative Analysis

The federal government has been making efforts aimed at the health promotion and disease prevention for some time. The first Surgeon General's report on the health effects of smoking, issued in 1964, and subsequent reports on the dangers of smoking helped to focus the nation's attention on the connection between behavior and health. There are now many federal programs that target unhealthy behaviors, ranging from research on the impact of behavior on disease processes to funding for state and local health promotion and prevention efforts. To give an idea of the magnitude of the efforts, the National Institutes of Health (NIH) spend about \$30 billion a year on research aimed at disease prevention.

A substantial amount of DHSS money is invested every year through Preventive Health and Health Services block grants to the states for programs and initiatives focused on changing people's behavior. We can evaluate these block grants by looking at the amount of the money granted to states in the particular year and by analyzing the goals of the state programs and initiatives, and the actual outcomes. We decided to look at the states that received the greatest and least amount in the grant money in the specific PHHS funding areas that relate to our behavior indicators. It turns out that while there are increases in behavior indicators rates, they seem not to be related with the amount of money particular states received in PHSS grant.

Physical Activity

Among states that are receiving the PHHS block grant for physical activity, New Jersey received the smallest amount in 2005 (\$26,840). These funds must be used to achieve the nation's health objectives, outlined in Healthy People 2010, by improving goals specific to New Jersey. Specific health objectives for New Jersey are outlined in their sister program Healthy New Jersey 2010. One of many goals in Healthy New Jersey 2010 goal relates to physical activity and involves increasing the percentage of persons aged 65 and over who participate in frequent, leisure time physical activity during the past month to 42.5%.²⁶ There are 1,443,782 persons aged 60 and older in New Jersey, of which 135,999 persons are age 85 years and older. Funded from the PHHS grant, Older Adult Health and Wellness Program in the Division of Aging and Community Services, New Jersey Department of Health and Senior Services, fosters the well-being of older adults and their caregivers through coordinated strategies aimed at health promotion, provider and consumer education and the prevention, early detection and prompt management of disease²⁷. One of the primary areas of concentration is physical activity (expands access to physical activity programs for older adults).

²⁶ http://www.state.nj.us/health/fhs/documents/fy07_phhs_blockgrantappl.pdf

²⁷ http://www.state.nj.us/health/fhs/documents/blockgrant_fy04.pdf

In 2005, Kentucky received the largest amount of money in PHHS block grant form for physical activity programs (\$1,397,016). The Kentucky Physical Activity Program is part of the Division of Adult and Child Health Improvement, Chronic Disease Prevention and Control Branch²⁸. The targeted population are Kentuckians of all ages who do not participate in physical activity a minimum of 30 minutes three to five times per week. Funding is provided to the local health departments in community-based interventions addressing physical activity across the life span. Every local health department in the state of Kentucky receives PHHS grant funds to address physical activity within their communities. The community-based plan identifies Healthy Kentuckians 2010 objectives to be targeted and the strategies and interventions to be conducted to address each objective. The local health department's physical activity plan and budget should focus on the evidence-based strategies that best accomplish the objectives in their comprehensive community plan.

The example of the community-wide campaign addressing physical activity is "Get Up, Get Out, Get Fit"²⁹. This campaign was specifically developed for rural communities to help their residents become more physically active and to help health departments create physical activity coalitions. The program combines a media campaign with a physical activity program. The components of this community-wide campaign include "tabloid" magazine called the *Active News* which feature non-athlete members of the community who are physically active. These people tell their story of how they fit physical activity into their daily lives. The magazine is inserted into the weekly community newspaper.

Successes in New Jersey and Kentucky point to a positive return to federal health investments. In 2003, 44.7% of New Jersey adults reported 30 or more minutes of physical activity five or more days per week or 20 or more minutes of rigorous physical activity three or more days per week. In 2005, this number went up to 45.9%. In 2003, 33.8% of Kentucky adults had 30 or more minutes of physical activity five or more days per week or 20 or more minutes of rigorous physical activity three or more days per week. In 2005, this number went up to 34.7%.

Nutrition and Obesity

Illinois received the smallest PHHS grant (\$14,500) for nutrition and overweight programs in 2005. The funding went to the Coordinated Approach To Child Health Program (CATCH), an elementary school program targeting students in third through fifth grade³⁰. The program has four components: school curriculum, physical education, school lunch, and family involvement. It attempts to build an alliance of parents, teachers, child nutrition personnel, school staff and community partners to teach children and their families how to be healthy for a lifetime. By teaching children that eating

²⁸ <http://chfs.ky.gov/NR/rdonlyres/91D15871-C936-445F-95E2-B0E7786DDA50/0/PA857InstructionsAmended.pdf>

²⁹ <http://chfs.ky.gov/NR/rdonlyres/995D4031-B71D-4DC0-A9CF-DCC2D7098898/0/PASummaries.pdf>

³⁰ http://www.schoolhealth.info/article.php?a_id=94&sub_dir=22

healthy and being physically active every day can be fun, the CATCH attempts to establish healthy habits in childhood that carry into adulthood.

California received \$843,041 in PHHS grant for nutrition and obesity programs in 2005. One of the programs that received the funding is California Project LEAN (Leaders Encouraging Activity and Nutrition) which is a joint program of the California Department of Health Services and the Public Health Institute focusing on youth empowerment, policy and environmental change strategies, and community-based solutions.³¹ Project LEAN's mission is to increase healthy eating and physical activity to reduce the prevalence of obesity and chronic diseases such as heart disease, cancer, stroke, osteoporosis, and diabetes. It works with state and local physical activity and nutrition leaders to conduct programs in communities throughout California. Project LEAN regional coordinators develop and implement community-based social marketing plans that promote behavior change at the local level, are driven by the target audience, and involve local coalitions in the decision-making process. Nine Project LEAN regions are promoting increased fruit and/or vegetable consumption and one region is promoting low-fat milk consumption.

Both states exhibited success in nutrition programs established through PHHS block grant money. Proper fruit and vegetable intake in Oklahoma was reported 23.1% people in 2003; and by 24% in 2005. In California these numbers were 26.9% people in 2003; and 28.9% in 2005.

Arthritis

Oklahoma received the smallest PHHS grant (\$4,554) for arthritis-related programs in 2005. The state's Arthritis Prevention and Education Program (APEP) seeks to improve the quality of life of all people affected by arthritis and related conditions and decrease social and medical costs that arthritis has on individuals and the state.³² APEP is located in the Office of Community Development, Community Health Services of the Oklahoma State Department of Health. The program administers and coordinates the activities of the Oklahoma Arthritis Network (OAN). OAN, established in 1999, is a cooperative effort among consumers, health professionals, business leaders, educators, and private/public organizations. APEP's goal to increase the quality of life among persons with arthritis acknowledges that at the initial stage of the program, resources would be best spent addressing the needs of persons already experiencing the pain and disability associated with arthritis. The examples of the program's activities include: Aquatics Program, PACE (People with Arthritis Can Exercise) Program, Arthritis Self Help Course (ASHC)³³.

North Carolina received \$150,000 in PHHS grant for arthritis-related programs in 2005 to fund the Osteoporosis Task Force. It was created by the General Assembly in

³¹ http://www.californiaprojectlean.org/views/Learn_About_California_Project_LEAN.asp

³² <http://www.health.state.ok.us/program/apep/>

³³ <http://www.health.state.ok.us/program/apep/programhighlights.pdf>

1997 to undertake a statistical and qualitative examination of the incidence of and causes of osteoporosis deaths and risk and to establish a profile of the osteoporosis burden in North Carolina³⁴. The Task Force is also charged with raising public awareness on the causes and nature of osteoporosis, personal risk factors, value of prevention and early detection, and options for diagnosing and treating the disease and with developing an osteoporosis prevention plan.

Diabetes

Nebraska received the smallest amount (\$49,757) in PHHS block grant money for diabetes programs in 2005. The Nebraska Diabetes Prevention & Control Program (NDPCP) works to reduce or prevent complications and premature death for Nebraskans with diabetes³⁵. The NDPCP strives to educate persons with diabetes, their families, and health professionals. One of the primary functions of the NDPCP is to increase public awareness. The Nebraska DPCP uses materials developed by the National Diabetes Education Program to promote public awareness of diabetes-related issues. NDEP campaigns conducted in Nebraska include “Be Smart About Your Heart: Control the ABC’s of Diabetes,” “ Small Steps, Big Rewards,” “Control Your Diabetes for Life”. The DPCP’s *Diabetes Newsbeat* newsletter, with a statewide circulation of approximately 9,000, also promotes awareness of key issues among people with diabetes throughout Nebraska. The other activities of DPCP include completing and publishing the *Nebraska State Diabetes Plan*; providing technical assistance to community groups, health professionals, organizations, institutions, and others who may be planning diabetes programs or activities; and updating information and training materials to ensure application of current knowledge and treatment of diabetes.

New Jersey received the largest PHHS block grant (\$432,151) for diabetes programs in 2005. Primarily funded through PHHS grants, New Jersey Diabetes Prevention and Control Program (DPCP) seeks to reduce the health impacts of diabetes by: 1) increasing awareness of diabetes and its complications, 2) improving the quality of diabetes care and access to care, 3) developing partnerships and increasing community involvement to address diabetes issues, and 4) utilizing data to better apply resources and improve health outcomes³⁶. Activities supported by the DPCP include: surveillance (using multiple surveillance sources to define the diabetes burden in the state); diabetes quality of managed care (the New Jersey Department of Health and Senior Services annually publishes an HMO Performance Report); health systems interventions (the DPCP produces a newsletter, Health Alert in Diabetes Care, which is distributed to primary care providers statewide); and community-based interventions (the DPCP provides funding for Southern Jersey Diabetes Outreach and Education System program that works with individuals and organizations to increase public awareness about diabetes and its complications).

³⁴ <http://www.dhhs.state.nc.us/docs/bcsearch.htm>

³⁵ <http://www.hhs.state.ne.us/dpc/ndcp.htm>

³⁶ <http://www.cdc.gov/diabetes/states/nj.htm>

Changes in nutrition and physical activity behavior patterns serve as a good measure for diabetes prevention programs. In 2003, 44.5% of Nebraska adults had 30 or more minutes of physical activity five or more days per week or 20 or more minutes of rigorous physical activity three or more days per week. In 2005, this number went up to 47.3%. Proper fruit and vegetable intake was reported by 17.8% of the surveyed people in 2003 and by 20.2% in 2005. The level of physical activity in New Jersey went up by 1.2 percentage points between 2003 and 2005. In terms of fruit and vegetable intake, 26.6% of people were consuming fruits and vegetables 5 or more times per day in 2003 and 25.9% in 2005.

Heart Disease

Maine received the smallest amount (\$35,000) in PHHS grant for heart disease-related programs in 2005. Its Cardiovascular Health Program is working to improve heart health in Maine by promoting tobacco-free lifestyles centered on physical activity and healthy diets.³⁷ The program goals seeks to reduce death, disability and health care costs due to cardiovascular disease, as well as reducing controllable risks for cardiovascular disease. Coordinated efforts include: assisting the thirty-one Healthy Maine Community Partnerships and other community groups to address physical inactivity, poor nutrition, tobacco use, high blood pressure and high cholesterol; assisting businesses in implementing low or no-cost strategies to improve employee health; developing and conducting a statewide media and public awareness campaign on physical activity and nutrition; developing state-level policies that support individuals making healthy choices. The Maine Cardiovascular Health Program especially focuses on populations that are disproportionately harmed by cardiovascular disease. These populations include low-income residents, people living in rural counties, Native Americans, women fifty and older, and persons with diabetes.

Ohio received \$2,747,236 in PHHS grant for heart-disease related programs in 2005. As Maine, the Ohio Department of Health also operates the Cardiovascular Health Program³⁸. The Community Heart Health Program (CHH), funded by PHHS block grant money, provides fiscal and technical assistance to local projects covering 24 counties. These projects use a population-based approach to expand, and enhance heart healthy communities. The local project staff uses four settings for their interventions: school, worksite, community, and healthcare. Their interventions encompass six risk factors: nutrition, physical activity, blood pressure, blood cholesterol, tobacco and diabetes. The examples of local projects include walking trails, healthy restaurant programs, community hike/walking challenges/and fitness events, and employee wellness programs offered at worksites.

³⁷ <http://www.maine.gov/dhhs/boh/hmp/mcvhp2.html>

³⁸ <http://www.healthiohioans.org/healthieryou/comm/cardio1.aspx>

As in the above examples, these efforts are associated with improvements in positive behavior patterns, namely physical activity and nutrition. In 2003, 53.1% of Maine adults had 30 or more minutes of physical activity five or more days per week or 20 or more minutes of rigorous physical activity three or more days per week. In 2005, this number went up to 54.1%. Proper fruit and vegetable intake was reported by 27% of the people surveyed in 2003 and by 28.7% in 2005. The numbers in Ohio tell only a slightly different story. In proper fruit and vegetable intake they remained constant (22.7% exhibiting good behavior in 2003 vs. 22.6% in 2005). However, physical activity exhibited a positive trend (47% in 2003 to 49.2% in 2005).

Cervical Cancer

The only PHHS block grant issued to confront preventative behaviors associated with cervical cancer went to the District of Columbia. DC received \$120,540 in PHHS grant for cervical cancer program in 2005 and went to fund the DC Breast and Cervical Cancer Early Detection Program also known as Project WISH (Women Into Staying Healthy). This program seeks to reduce the District's breast, cervical, and ovarian cancer burden through the provision of health education, technical expertise, case management, and coordination of early detection services for District residents.³⁹ The Program provides free cancer education, screening, and diagnostic services to low-income District women with little or no health insurance. Women aged 18 and older are eligible for a free annual clinical breast exam, Pap test, and pelvic exam. Women ages 40 and older are also eligible for a free annual mammogram. Free transportation and interpreter services are available for appointments.

Despite the efforts of WISH, the numbers of Pap test prevalence remained roughly constant. In 2002, 88% women living in DC received Pap smear test during the past 3 yrs; in 2004 – 87%.

Regression Analysis

Of the four models estimated using ordinary least squares regression, only one estimates a measurable effect of federal spending upon a change in behavior. This small, but positive association is identified between spending in the year 2000 and the percentage change in regular physical activity. This result suggests that, holding all else constant, for every dollar spent per 100,000 in population, a .001% increase can be expected in the percentage of people who engage in regular physical activity.

While this regression analysis provides evidence suggesting that federal spending has no measurable effect upon changes in behavior, the statistically significant effect of funding in the year 2000 upon regular physical activity is, potentially, illustrative of a less obvious, underlying trend. More specifically, this finding may be indicative of a delayed reaction in behavior.

³⁹ http://app.doh.dc.gov/services/special_programs/breast_cervical/index.shtm

In other words, it is possible that spending does affect behavior; however, this analysis is not capturing a measurable effect because the time interval between spending and behavioral observation may be too small. If spending data were included from years prior to 2000, it may be possible to observe measurable effects. Based solely upon the results of this regression analysis, it is not possible to make inferences regarding the magnitude of these potential effects. These results only suggest the possibility of a lagged spending effect.

Aside from the spending variables, a few statistically significant relationships appear between changes in the behavioral indicators and the demographic variables included in the models. In the model for self-reported health status, both education and median age are associated with positive effects. This suggests that the older and more educated the population, the more likely it is they will report a healthier status. While the education effect is not entirely surprising, the effect on age is not immediately intuitive. It is possible that the omission of an important variable or variables is driving this result.

Table 2A: OLS Regression Output for Models of Change in Behavioral Indicators

Models of Change in Behavioral Indicator Variable				
OLS Regression Output				
<i>(measured in percent change)</i>				
<i>*standard errors in parentheses</i>				
<u>Variable</u>	<u>Health Status</u>	<u>Fruit & Veg. Intake</u>	<u>Regular Physical Activity</u>	<u>Pap Test in Past 3 Yrs</u>
Spending 2000	0.00000 (7.42xE-7)	0.00001 (4.09E-6)	0.00001 (2.15E-6)**	0.00000 (1.11E-6)
Spending 2004	0.00007 (.0002)	-0.00020 (.0013)	0.00000 (.00069)	-0.00017 (.00036)
Spending 2005	-0.00009 (.0002)	0.00020 (.0015)	0.00000 (.00077)	0.00019 (.0004)
Median Income	0.00000 (4.56xE-7)	0.00000 (2.48E-6)**	0.00000 (1.3E-6)	0.00000 (6.98E-7)
Pecent w/ College Degree	0.00100 (.0005)*	-0.00500 (.0032)	0.00152 (.0017)	0.00022 (.0009)
Median Age	0.00230 (.001)*	-0.00800 (.0059)	0.00091 (.0031)	0.00332 (.0016)**

*indicates significance at the .1 level
**indicates significance at the .05 level

The only demographic variable exhibiting an effect on fruit and vegetable intake is median income. Based upon the regression output, every dollar increase in median income is associated with a .0004% increase in fruit and vegetable consumption. In terms of the model for changes in the percentage of women receiving pap tests, age represents the only demographic variable associated with a positive change in behavior. Table 2A illustrates the regression output for all four models. Statistically significant marginal effects are highlighted.

Table 2B: Probit Regression Output for Models of Likelihood of Improvement in Behavior

Models of Likelihood of Improvement in Behavioral Indicator Variable				
Probit Regression Output- Marginal Effects				
<i>(improvement is measured as increase or no decline in indicator variable)</i>				
<i>*standard errors in parentheses</i>				
Variable	Health Status	Fruit & Veg. Intake	Regular Physical Activity	Pap Test in Past 3 Yrs
Spending 2000	-0.00004 (.00013)	0.00005 (.0062)	0.00017 (.0007)	0.00000 (.0000)
Spending 2004	-0.00460 (.0067)	-0.00540 (.0407)	-0.00038 (.00519)	0.00000 (.00002)
Spending 2005	0.00525 (.0075)	0.00330 (.0518)	0.00024 (.00509)	0.00000 (.00002)
Median Income	0.00000 (.00001)	0.00004 (.000047)	0.00000 (.00002)	0.00000 (.00000)
Pecent w/ College Degree	0.01440 (.0161)	0.02269 (.0682)	0.00161 (.00884)	0.00000 (.00001)
Median Age	0.02806 (.0313)	0.04620 (.1027)	0.00327 (.0252)	0.00001 (.00009)
*indicates significance at the .1 level				
**indicates significance at the .05 level				

In addition to the linear regression models, probit models were estimated to determine whether spending increases the likelihood that a state will improve in its performance on the four behavioral indicator variables. Because this type of model requires the use of a binary categorical variable as the dependent variable, and there are three possible outcomes in this situation (decline, maintain, or improve), states that demonstrated no change in behavioral indicators were grouped with those states that demonstrated an improvement. We viewed a no change, status quo outcome as a positive one. Each marginal effect in Table 2B can be interpreted as the percentage point effect a unit change in the explanatory variable has upon the likelihood that a state will stay the same or improve on each of the behavioral indicator variables. No statistically significant

effects were estimated by the probit methods for any of the explanatory variables included. Based upon this result, there is further evidence that federal spending has no direct effect upon behavior.

Limitations of the Study

There are significant limitations associated with the specific models estimated in this analysis that are worth considering when interpreting and attempting to generalize its results. One limitation emerges from the lack of data available for both spending and behavioral changes over the five year timeframe of this study. Only three years of PHHSBG data are included, and the time period over which the change in behavioral indicator variables is calculated is not the same across indicators. For example the percent change in self-reported health status is based upon BRFSS observations from 2005 and 2000, while the percentage change in fruit and vegetable intake is based upon observations from 2005 and 2002. When the interval over which changes are calculated is smaller, less variation is likely to be captured, and thus, it may be more difficult to identify statistically significant relationships between variables.

It is also worth considering that, given the multitude of observable and unobservable factors likely to affect behavior, the potential for omitted variable bias in the models specified is large, and if existent, will bias the effects estimated. In terms of potential omitted relevant explanatory variables, possibilities include, but are not limited to:

- Private sector spending on the marketing of products and services that have negative effects on health (i.e. junk food, tobacco, alcohol, automobiles, etc.)
- Private sector spending on the marketing of products and services that have positive effects on health (i.e. health foods and beverages, gyms, fitness equipment, etc)
- Other spending on health promotion and disease prevention efforts (other federal departments and agencies, foundation support, social marketing campaigns, state and local government run programs, insurance company incentive structures, business initiatives, etc)
- Presence of state-level legislation regarding health promotion and disease prevention
- Degree of access to health services
- Environmental factors (i.e. stress, pollution, community design, etc)
- Genetic factors
- Government subsidies (i.e. corn, sugar, etc)
- Attitudes toward health and healthy behaviors

In order to truly isolate the effect of federal spending upon changes in behaviors, it would be necessary to incorporate measures of each of these additional variables into regression models. Because so many of these variables are difficult, if not impossible, to accurately measure, the use of experimental methods may provide the best means for disentangling any possible effect of spending on behavior.

VI. Conclusion and Recommendations

Ideal Scenario for Analysis

In order to conduct the most comprehensive analysis, there are many components that we would like to have available. First, it would be desirable to have data on the total monies appropriated for national and state level Healthy People 2010 initiatives for at least ten years. Additionally, for this extended time period, we would like to have data on all behavioral indicators that would be necessary for our analysis. Because there are a multitude of less-quantifiable variables likely affecting behavior; ideally, future analysis would involve the use of experimental methods that provide for a more controlled setting in which to examine correlations between spending and behavioral outcomes. In a perfect setting, all of these elements would allow us to complete a lagged, cross-section, time-series analysis. While we are confident in the statistical analysis we performed, we are also aware of its limitations. As with any problem in life, additional information from trustworthy sources can have greater positive effects on the hopes of discovering possible solutions.

Policy Recommendations

This study is aimed to identify whether an association exists between federal spending on health promotion and disease prevention and observable changes in people's health-related behaviors. In an effort to narrow the focus of the study to a funding stream directly and immediately supporting the types of health interventions relevant to Healthy People 2010, the Preventive Health and Health Services Block Grant was selected as the exclusive spending variable analyzed.

An examination of the experiences of the states receiving both high and low quantities of PHHSBG dollars for programs relevant to the study's four focus areas (diabetes, heart disease, cervical cancer, arthritis) revealed many indications of smaller-scale positive effects. Data from the most of the states analyzed report positive changes in health-related behavior ranging from 1 percentage point to as many as 7 percentage points. These increases in the physical activity level and fruit and vegetable intake show that specific state programs and initiatives might greatly contribute to the change in the individual behavior. Therefore, flexible state funding through PHHSBG is very important to assure that each state can develop programs targeting state-specific problems and populations. Programs and initiatives that focus on particular groups or localities within states seem to be the best way to achieve goals relating to health promotion and disease prevention.

In contrast to the results of the micro-level analysis of state programs, the results of regression analysis seem to suggest that, generally, spending does not influence behavior. With the exception of one statistically significant effect, both linear and nonlinear regression techniques indicate that spending has no measurable effect upon health status, fruit and vegetable intake, activity level, and utilization of preventive tests. This finding is not entirely surprisingly, given the high degree of private sector spending

with which public dollars must compete and the relatively small temporal interval analyzed between spending and behavioral observation. The single statistically significant relationship, identified between spending in the year 2000 and regular physical activity, may be indicative of a delayed behavioral response to spending not captured by this analysis.

In light of these findings, it appears that federal funding is capable of affecting behavior. However, this capacity appears to be related to the degree to which funding is targeted. As evidenced by the contradictory results of the micro-level state analysis and the macro-level regression analysis, addressing the nation's diverse health problems with one-size-fit-all solutions is not likely to serve as an efficient or effective strategy for improving health. The relationship identified between 2000 federal spending and levels of regular physical activity suggests that it may take time to observe behavioral effects. For these reasons, it is recommended that the federal government continue to appropriate funding for programs, such as the PHHSBG, that allow states to address their specific health concerns in unique and innovative ways.

The success of Healthy People 2010 as a framework for the objectives of national and state-level policy initiatives is intimately tied to the reliability and accessibility of relevant data. We encountered many difficulties when attempting to collect data from a variety of recognized and reliable sources. The objectives set by Healthy People 2010 become meaningless if it is not feasible to track the progress of the nation in achieving these objectives. One possible recommendation would be diligently enforced compliance with regulatory reporting requirements as a condition of receiving funds designated for Healthy People 2010 initiatives.