Milken Institute

AN UNHEALTHY AMERICA:
The Economic Burden of Chronic Disease

**Charting a New Course to Save Lives and
Increase Productivity and Economic Growth**

October 2007

By Ross DeVol
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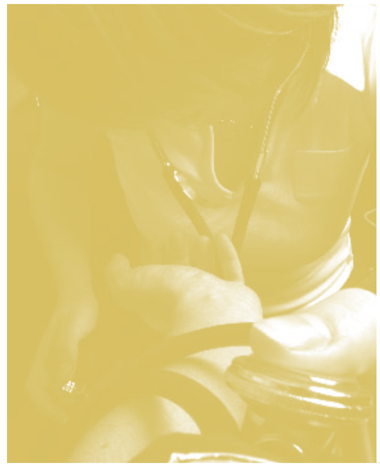
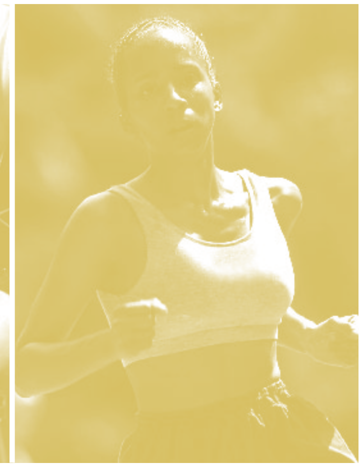




More than half of Americans suffer from one or more chronic diseases. Each year millions of people are diagnosed with chronic disease, and millions more die from their condition. By our calculations, the most common chronic diseases are costing the economy more than $1 trillion annually—and that figure threatens to reach $6 trillion by the middle of the century. Yet much of this cost is avoidable. This failure to contain the containable is undermining prospects for extending health insurance coverage and for coping with the medical costs of an aging population. The rising rate of chronic disease is a crucial but frequently ignored contributor to growth in medical expenditures.

Of course, the personal and financial consequences of avoidable illness are greatest for those who become ill and their families. In this research, however, we focused on the narrower, more tangible costs of chronic illness: the medical resources used to treat avoidable illness; the impact on labor supply (primarily through lower productivity), and thus GDP; and the drag on long-term economic growth. Specifically, we analyzed the impact of seven of the most common chronic diseases—cancer (broken into several types), diabetes, hypertension, stroke, heart disease, pulmonary conditions, and mental disorders—and estimated the economic costs that could be avoided through more effective prevention and treatment. Even before considering the suffering of those with these diseases, the magnitude of these potential economic benefits would justify increased investment in preventive health measures.

The news about Americans' health is a mixed bag. Dramatic improvements in therapies and treatment have led to higher quality of life, less disability, and lower rates of mortality. Fatality rates for colon cancer began to drop in the early 1980s, while breast, prostate, and lung cancers followed similar patterns in the early 1990s. The most dramatic improvements in morbidity and longevity have come from advances in the treatment and prevention of heart disease: the likelihood of dying from heart ailments began waning in the mid-1960s.

But while treatment outcomes and mortality have been improving, the rates of chronic disease are steadily increasing and, if left to grow unchecked, threaten to cancel out these gains. The past twenty years have seen dramatic growth in the percent of the population diagnosed with diabetes and cardiovascular disease, driven in large part by increased rates of obesity. The incidence of stroke is rising, in large part because more people are surviving to old age. Rates of pulmonary disease have also risen in recent decades. And reported cases of mental disorders, including depression, are growing, too.

Reducing the avoidable costs associated with these conditions is central to meeting the twin challenges of promoting affordable health care and fostering continued economic growth. We have a choice: continue on the current path or alter it by changing our behaviors and focusing on prevention and early intervention.

Current Treatment Costs and Productivity Losses

Federal survey data allow us to catalog the number of cases of chronic illness and the costs of treating them. The latest available information shows that in 2003, expenditures to treat the seven selected diseases totaled $277 billion for *non-institutionalized* Americans.[1] This is a conservative figure because it excludes the considerable health expenditures of the institutionalized population and because it excludes the spending associated with follow-on health consequences of the seven listed conditions. The latest available data at the

1. Analysis used the Medical Expenditure Panel Survey (MEPS) data from 2003, the most recent year available at the time of the analysis. The 2004 MEPS data have since been released.

time of the analysis show that the total number of cases of these conditions is 162 million, but the number of Americans afflicted with these chronic diseases is smaller (109 million) because many have more than one condition—for example, diabetes, hypertension, and heart disease. Differences in lifestyles (smoking, alcohol abuse, diet, exercise), along with demographics (age distribution, ethnicity) and urbanization, partly explain differences in disease rates.

The potential savings on treatment represents just the tip of the proverbial iceberg. Chronically ill workers take sick days, reducing the supply of labor—and, in the process, the GDP. When they do show up for work to avoid losing wages, they perform far below par—a circumstance known as "presenteeism," in contrast to absenteeism. Output loss (indirect impacts) due to presenteeism (lower productivity) is immense—several times greater than losses associated with absenteeism. Last (but hardly a footnote), avoidable illness diverts the productive capacity of caregivers, adding to the reduction in labor supply for other uses. Combined, the indirect impacts of these diseases totaled just over $1 trillion in 2003.

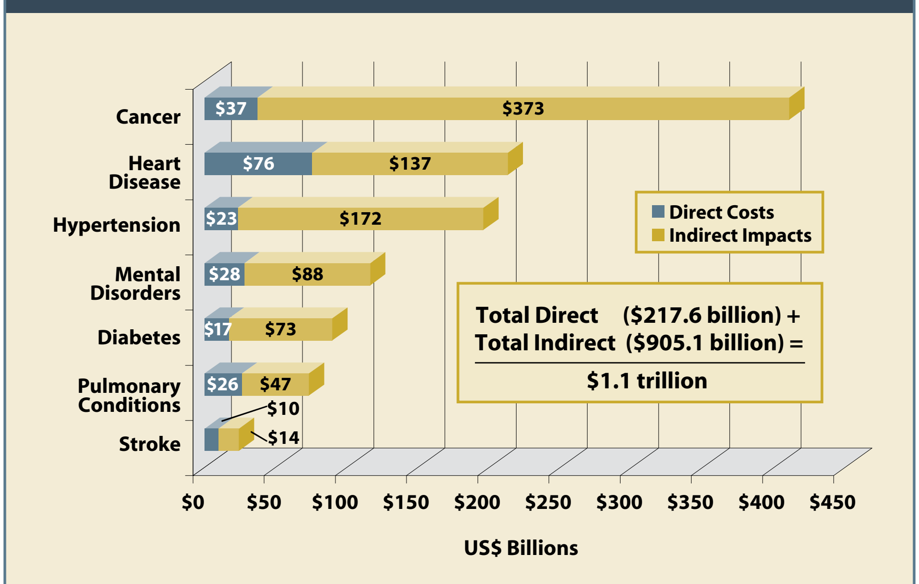
Avoiding Treatment Costs and Productivity Losses

To quantify the potential savings from healthier lifestyles and plausible but modest advances in treatment, we compared a "business-as-usual" baseline scenario with an optimistic scenario that assumes reasonable improvements in health-related behavior and treatment. The major changes contemplated here are weight control combined with improved nutrition, exercise, further reductions in smoking, more aggressive early disease detection, slightly faster adoption of improved therapies, and less-invasive treatments. The impacts of these factors vary widely by condition—gains against diabetes depend largely on reductions in obesity, while colon cancer advances depend heavily on wider early screening. A complete description of the assumptions on which these scenarios are based can be found in the full report.

Across the seven diseases, the optimistic scenario would cut treatment (direct) costs in 2023 by $217 billion (figure ES-1). And the cumulative avoidable treatment costs from now through 2023 would total a whopping $1.6 trillion. Note that this would be a gift that keeps on giving, saving hundreds of billions annually in the years beyond 2023.

For the broader impact on economic output, again we compared baseline and optimistic scenarios to estimate the potential gains (that is, avoided losses) associated with better prevention, detection, and treatment of chronic diseases. For all chronic diseases covered, the difference between the two scenarios in 2023 is a remarkable $905 billion (figure ES-1), while the cumulative difference in GDP over two decades is $6.9 trillion. Plainly, absenteeism and lower productivity on the job linked to chronic disease are major factors limiting economic growth and reducing living standards.

Figure ES-1 :: Avoidable Treatment Costs and Output Losses, 2023



Note: Treatment expenditures for individuals in nursing homes, prisons, or under other institutional care are not included. Treatment expenditures for comorbidities and secondary effects of listed disease are also excluded.
Sources: MEPS, NHIS, Milken Institute

Impacts of Major Behavioral Risk Factors

All told, our analysis implies that modest reductions in avoidable factors—unhealthy behavior, environmental risks, and the failure to make modest gains in early detection and innovative treatment—will lead to 40 million fewer cases of illness and a gain of over $1 trillion annually in labor supply and efficiency by 2023. Compared to the costs we project under the business-as-usual scenario, this represents a 27 percent reduction in total economic impact.

To get a clearer sense of the relative impact of the two most important behavior factors—obesity and smoking—we again compared alternate scenarios, holding all other factors at the baseline values. Lower obesity is projected to reduce cases of illness by 14.8 million in 2023, which cuts $60 billion from the national treatment bill and improves GDP by $254 billion. A parallel calculation for smoking alone suggests that lower tobacco use is responsible for 9.4 million fewer illnesses in 2023, along with $31 billion less in treatment costs and $79 billion in added productivity.

Impacts at the State Level

Differences in lifestyles (smoking, alcohol abuse, diet, exercise), along with demographics (age distribution, ethnicity) and urbanization, partly explain differences in disease rates among the states. States with the highest rates of chronic disease also tend to have the worst readings on behavioral risk factors, the highest percentage of elderly residents, and a demographic mix predisposed to one or more chronic diseases.

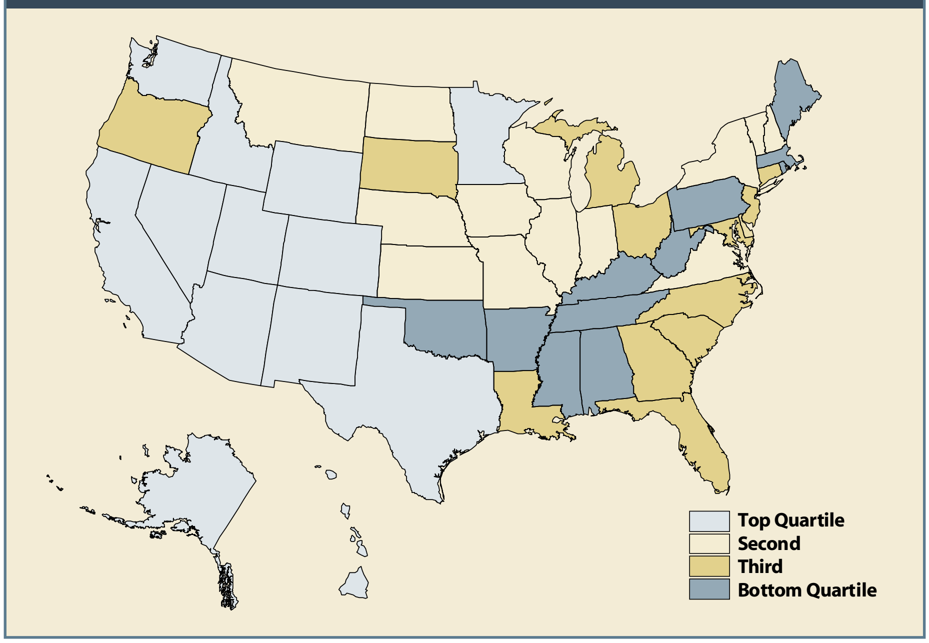
The map in figure ES-2 groups states according to their rankings on the Milken Institute State Chronic Disease Index, which measures the concentration of chronic diseases. As the map shows, the least healthy states lie in a belt of obesity and smoking that runs from the Northeast through Oklahoma. West Virginia, Tennessee, Arkansas, Kentucky, and Mississippi all fare poorly. The low scores for Massachusetts and Maine result from the high incidence of cancers and perhaps more complete reporting. Those with the healthiest populations are in the West, led by Utah, Alaska, Colorado, New Mexico, and Arizona.

We find that all states stand to gain in the optimistic scenario, with even the less-populous states, such as Alaska, avoiding 79,000 cases of chronic disease (a 16.4 percent reduction) and achieving benefits of $2.6 billion (27 percent) through lower treatment costs and higher productivity in 2023. Among the most populous states, California avoids 4.3 million (17.6 percent) cases of chronic disease and gains $117.1 billion through lower treatment costs and higher productivity in 2023.

Forgone Economic Growth Over the Long Term

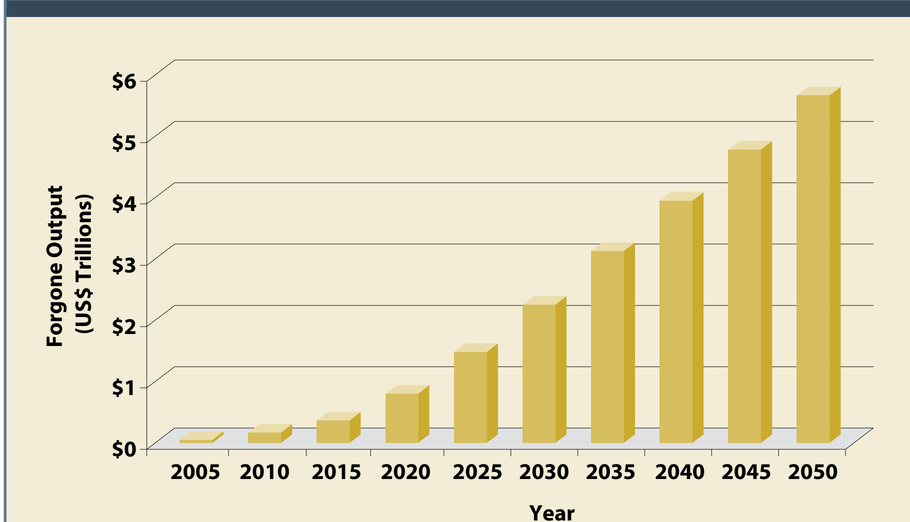
The long-term impact of chronic disease on economic growth—the consequence of less investment in human and physical capital—is likely to be of even greater magnitude than the impact of treatment costs and lost labor supply. This is because improvements in health today also yield increased investment in education and training a generation from now.

Figure ES-2 :: State Chronic Disease Index



Note: States in the top quartile have the lowest rates of seven common chronic diseases.
Source: Milken Institute

Figure ES-3 :: Long-Term Forgone Economic Output
Change in Real GDP Between Baseline and Optimistic Scenarios



Source: Milken Institute

Existing estimates of the economic impact of disease tend to ignore the productivity growth that results over the long term as returns on human capital investment accrue to subsequent generations.

We used a standard economic model of the relationship between inputs (capital, labor, skills) and output to simulate this impact, with health affecting the rate of investment and thus the rate of economic growth. Life expectancy at age 65 serves as a plausible proxy for this health variable, which affects decisions to invest both in human capital (education) and physical capital. An innovation from our research is the recognition of the dynamic feedback between health and human capital formation over time.

Comparing a baseline, business-as-usual scenario with an optimistic scenario assuming substantial (but plausible) reductions in chronic disease cases yields a gap of $1.2 trillion in real GDP terms in 2023, widening to $5.7 trillion in 2050 (a percentage difference of 17.6 percent). This represents a difference of about three-tenths of a percentage point in average annual economic growth resulting from lower rates of investment in education and physical capital. As a benchmark, over the past twenty years, real GDP growth has averaged 3.0 percent (see figure ES-3).

The Big Picture

While the avoidable treatment costs of less-than-optimal prevention and early intervention are large, the avoidable impact on GDP linked to reduced labor supply and lower rates of investment is gigantic. The good news implied is that the potential economic returns to initiatives that lead to a healthier population are enormous. To that end, we offer some guidelines for change.

Incentives in the health-care system should promote prevention and early intervention. Employers, insurers, governments, and communities need to work together to develop strong incentives for patients and health-care providers to prevent and treat chronic disease effectively. In many respects, we've gotten what we paid for: only a tiny fraction of health-care spending is devoted to the promotion of healthier behavior, despite the fact that preventable chronic diseases are linked to smoking, obesity, lack of exercise, and drug and alcohol use.

As a nation, we need to renew our commitment to achieving a "healthy body weight." Rising obesity rates threaten to send treatment costs for diabetes and related conditions, such as heart disease and stroke, soaring over the next twenty years. There needs to be a strong, long-term national commitment to promote health and wellness.

The rapid growth of chronic disease is costing us lives, quality of life, and prosperity. The current health-care debate rightly focuses on the extension of coverage to the uninsured and the design of a financing mechanism that is both fair and efficient. We suggest that the nature of services provided—the failure to invest in prevention and early intervention—deserves equal place in the debate. An increased emphasis on prevention would both improve the health of Americans and offset some of the costs of an aging population by increasing economic productivity.

This analysis should be seen as a contribution toward a sorely needed national discussion on health-care spending and chronic disease. Further research is necessary to bring additional precision and knowledge in measuring the economic, human, and social costs of preventable chronic disease and identifying opportunities to reduce or avoid them.

RESEARCH FINDINGS

More than half of all Americans suffer from one or more chronic diseases.[1] Each year millions of people are diagnosed with chronic disease, and millions more die from their condition. Despite dramatic improvements in therapies and treatment, disease rates have risen dramatically. Diabetes has become a new national epidemic, and rapidly rising rates of obesity and cardiovascular disease threaten to cancel out the gains we have made over the past decades.[2]

The rising rate of chronic disease is a crucial but frequently ignored contributor to rising medical expenditures.[3] The health of Americans and the economy depend on our ability to focus our efforts to reduce the burden of disease. In the absence of concerted efforts to prevent, diagnose, and better manage and treat chronic disease, we as a society will needlessly bear higher socioeconomic costs over time.

The human and economic toll of chronic disease on patients' families and society is enormous. Yet while a number of studies have sought to estimate the economic costs of illness, there has not been a significant focus on estimating the costs that could be avoided through efforts to reduce the prevalence and burden of chronic disease. The purpose of this study is to quantify the economic and *business costs* of chronic disease: the potential impact on employers, the government, and the nation's economy. This study documents what the country stands to lose in terms of economic growth—more than a trillion dollars within two decades—if we fail to make reasonable changes that improve the health status of Americans.

This study estimates current and future treatment costs and lost productivity for seven of the most common chronic diseases—cancer (broken into several types), diabetes, hypertension, stroke, heart disease, pulmonary conditions, and mental disorders. Each has been linked to behavioral and/or environmental risk factors that broad-based prevention programs could address. Reducing the avoidable costs associated with these conditions is central to meeting the twin challenges of promoting affordable health care and fostering continued economic growth.

While this study was designed to quantify the economic impacts of chronic disease, it differs from other studies of the cost of illness in several important respects. First, because our focus is not the impact of any one disease, but the aggregate impact on the economy, we do not attempt to estimate the full cost of the health consequences of each disease by taking into account the costs of other health problems caused by the underlying conditions. We also exclude costs associated with the institutionalized population, i.e., those in nursing homes, prisons, the military, or under other supervised care, as our focus is on the working population; and we do not quantify the costs to workers and their families of future lost wages due to premature deaths. As a result, our estimates of treatment costs and of lost productivity are likely to understate the true costs.

Our findings are organized to address the following questions.

1. WHAT DOES CHRONIC DISEASE CURRENTLY COST US? For each of the seven diseases, we calculate the number of people with a reported case, the treatment costs, and lost productivity and workdays.

- More than 109 million Americans report having at least one of the seven diseases, for a total of 162 million cases.
- The total impact of these diseases on the economy is $1.3 trillion annually.
- Of this amount, lost productivity totals $1.1 trillion per year, while another $277 billion is spent annually on treatment (not including costs to treat the follow-on health consequences of these diseases).

2. WHERE IS OUR CURRENT COURSE TAKING US? We project rates of disease, treatment costs, and lost economic output over a twenty-year period, assuming that current trends continue. On our current path, in 2023 we project:

- A 42 percent increase in cases of the seven chronic diseases, for a total of 230.7 million.
- $4.2 trillion in treatment costs and lost economic output.

3. WHAT COSTS ARE AVOIDABLE IF WE MAKE IMPROVEMENTS IN PREVENTION AND TREATMENT? We then project rates of disease and associated costs under a more optimistic scenario, assuming modest improvements in preventing and treating disease. We find that in 2023, compared with the baseline scenario:

- We could avoid 40 million cases of chronic disease.
- We could reduce the economic impact of disease by 27 percent, or $1.1 trillion annually; we could increase the nation's GDP by $905 billion linked to productivity gains; we could also decrease treatment costs by $218 billion per year.
- Lower obesity rates alone could produce productivity gains of $254 billion and avoid $60 billion in treatment expenditures per year.

4. WHAT ARE THE IMPACTS OF THESE SEVEN CHRONIC DISEASES AT THE STATE LEVEL? We quantify current and future avoidable costs for each state. We find that:

- Currently, the burden of disease varies widely: Utah has the lowest rates of chronic disease, followed by Alaska, Colorado, New Mexico, and Arizona. States with the highest rates include West Virginia, Tennessee, Arkansas, Kentucky, and Mississippi.
- All states stand to gain from a focus on prevention, with total avoided costs (from lower treatment costs and higher productivity) ranging from 26 percent to 28 percent of the baseline projected costs in 2023. We estimate the highest percentage savings in Washington, followed by Mississippi, Delaware, and North Dakota.

5. WHAT IS THE LONG-TERM IMPACT OF REDUCING THE DISEASE BURDEN? Building on the twenty-year projections, we assess the importance of investment in better health to human capital and national economic performance over a longer time horizon. We find that by 2050:

- Real GDP could increase by $5.7 trillion, 17.6 percent higher than the baseline projection.

6. WHAT ARE THE IMPLICATIONS OF OUR FINDINGS? We conclude that investment in good health is an investment in economic growth, and make two recommendations:

- Incentives in the health-care system should reward prevention.
- The nation should renew its commitment to achieving a "healthy body weight."

This study relies on the most recent and reliable public data available. For estimates of treatment expenditures, we use information from the Medical Expenditure Panel Survey (MEPS) to estimate the costs of treating each disease. The MEPS survey, launched in 1996 by the federal Agency for Healthcare Research and Quality (AHRQ), collects national and regional (census-based) data on specific services (for the non-institutionalized population), the frequency of service, and payment methods, and is the only consistent source of health spending data that allows for comparisons among states. We use data from 2003, the most recent year for which data were available at the time of this analysis.

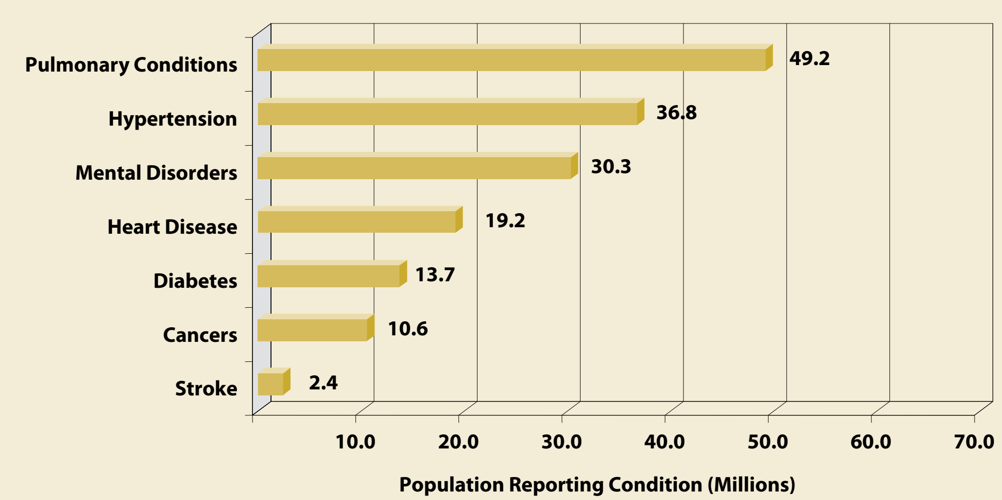
For our estimates on demographic and behavioral trends, as well as to estimate lost productivity, we rely on the U.S. Census Bureau, the Behavioral Risk Factor Surveillance System (BRFSS), and the National Health Interview Survey (NHIS).

I. Current Economic Impact of Chronic Disease

> **The combined cost of treatment expenditures and lost economic output for the U.S. was $1.3 trillion for these seven diseases in 2003.**

The past twenty years have seen dramatically rising rates of diabetes and cardiovascular disease.[4] Many observers report that diabetes rates are reaching epidemic levels.[5] For example, it was recently reported that one in eight New Yorkers has diabetes, and that one in three Americans will develop diabetes over the course of his or her lifetime.[6] Cases of pulmonary conditions, including asthma and chronic obstructive pulmonary disorder (COPD), have also increased, tied in part to worsening air quality. And the nation has seen a rapid increase in the prevalence of depression, as well as other types of mental disorders.[7] Skyrocketing obesity levels may portend an epidemic of chronic diseases and related treatment costs that threaten to overwhelm the public and private sectors.

Figure 1 :: Number of People Reporting Selected Chronic Diseases, 2003

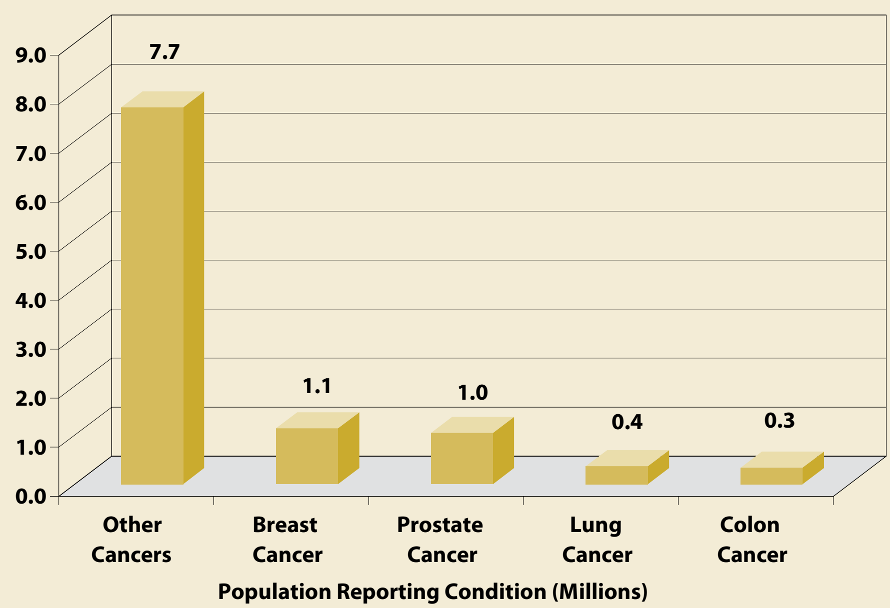


Sources: MEPS, Milken Institute

Nationwide, we find that more than one in three Americans report having one of the seven diseases we study here, with a total of 162.2 million cases in 2003, the most recent year for which comprehensive data were available at the time of this analysis (see figure 1). Of the diseases, pulmonary conditions were the most common, with 49.2 million cases recorded. Next in prevalence were hypertension, with 36.8 million recorded cases, and mental disorders, with 30.3 million; followed by heart disease at 19.2 million; diabetes at 13.7 million; cancer at 10.6 million; and stroke at 2.4 million.

The next figure illustrates the number of Americans with reported cases of cancer in 2003.

Figure 2 :: Number of People Reporting Selected Cancers, 2003



Sources: MEPS, Milken Institute

On a more positive note, dramatic improvements in therapies and treatment have led to higher quality of life, less disability, and lower rates of mortality. In recent years, most cancers have experienced a drop in incidence and death rates. The shift began with colon cancer death rates in the early 1980s; lung, breast, and prostate cancers followed similar patterns in the early 1990s. New cases of colon cancer fell after 1985; of lung cancer in 1993; breast cancer in 1999; and prostate cancer in 2003. Significant advances have also been made in treatment of cardiovascular disease. [8] Death rates related to heart disease began to diminish in the mid-1960s. Approximately half of the decrease in recent deaths in cardiovascular disease can be attributed to medical treatment.[9]

Next we discuss our estimates of current treatment expenditures and productivity losses associated with the current burden of disease.

Current Treatment Expenditures

In 2003, treatment expenditures for the diseases studied totaled $277.0 billion. Expenditures were highest for heart disease, at $64.7 billion. For the five cancers, expenditures totaled $48.1 billion. Mental disorders ranked third, at $45.8 billion, followed by pulmonary conditions at $45.2 billion; hypertension at $32.5 billion; diabetes at $27.1 billion; and stroke at $13.6 billion.

These estimates are conservative in two ways. First, we exclude costs for individuals in institutions—many of whom suffer from chronic disease. Second, because this study addresses a number of chronic diseases, we necessarily

> **Nationwide, expenditures totaled $277.0 billion, a conservative estimate that excludes the costs of related health conditions, as well as all costs for individuals in nursing homes, prisons, or other institutions.**

focus only on the costs that can be attributed directly to the treatment of each disease and exclude the costs of comorbidities and secondary effects.[10] For example, diabetes is a risk factor in the development of circulatory and cardiovascular disease, and as a result, people with diabetes generally have health costs much higher than those without diabetes. The American Diabetes Association has estimated that the total treatment cost of diabetes, including comorbidities attributable to diabetes, was $91.8 billion in 2002.[11] The attribution of costs differs when there are one or more comorbidities, including those that can be a risk factor or main cause of the primary disease. Given our focus on the aggregate impacts, we did not seek to identify additional costs that could be attributed to comorbidities or to apportion costs between diseases (for example, to determine what share of cost of heart disease might be the consequence of diabetes).

As noted above, our estimates are based on MEPS data.[12] MEPS reports the numbers of population reporting condition (PRC).[13] In this summary, for simplicity, we refer to cases of a disease; however, it is important to note that this refers to "population reporting a condition" as used in the MEPS data files.

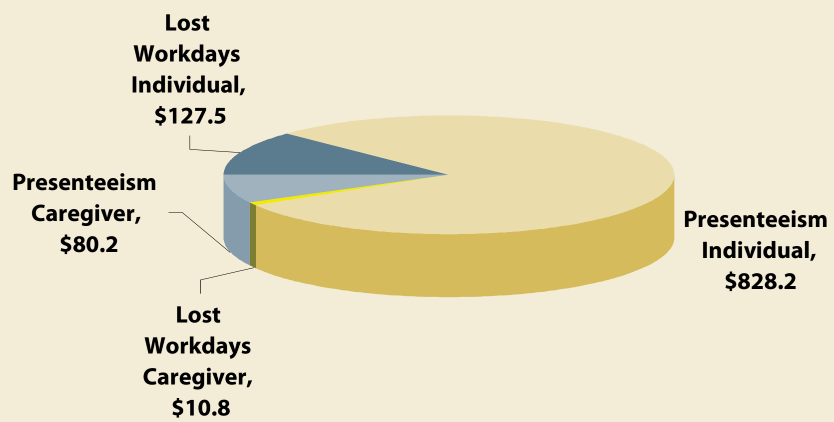
Current Productivity Losses

Good health is a vital component of individual well-being. But it also plays a large role in employee productivity. When individuals suffer from chronic disease, the result is often diminished productivity. An ill employee who shows up for work (to avoid sick days, for example) may not perform well, a circumstance known as "presenteeism." According to recent studies conducted by Nicholson et al., we cannot ignore the effect of presenteeism on output loss.[14] Other literature also suggests that output loss due to presenteeism is immense; some research suggests that for certain diseases, it can be up to fifteen times greater than for absenteeism, which is defined as work missed due to sick days.[15] For example, a study by Loeppke and colleagues in the *Journal of Occupational and Environmental Medicine* finds that the costs of productivity loss were four times as great as the direct medical costs of a chronic condition.[16] Caregivers also contribute to lost productivity through missed workdays and presenteeism.

To calculate the economic impact of lost workdays and presenteeism, we rely on representative data on lost work time from the National Health Interview Survey (NHIS). We then calculate the cost of lost work time using an approach that takes into account each worker's contribution to economic output (GDP).[17] Of course, being ill has many impacts for a worker, some of which are not easily quantifiable. For example, illness can lead to unwanted job changes, affect opportunities for promotion, and determine an employee's ability to take on additional job-related training. Our estimates do not attempt to capture all of these costs to the worker.

Overall, we find that individual presenteeism accounts for the greatest loss in output, at 79.1 percent of the total (see figure 3).

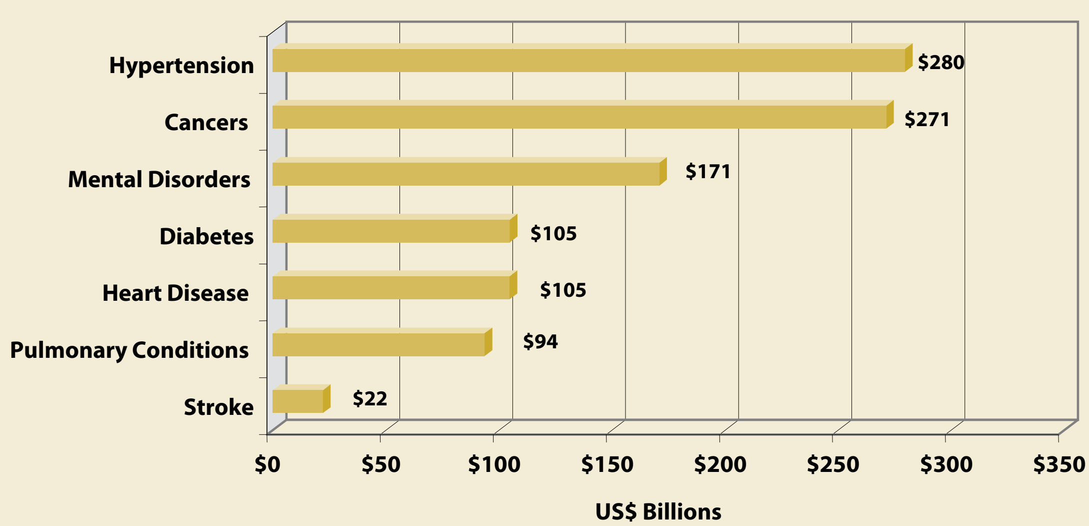
Figure 3 :: Lost Productivity by Source, 2003
US$ Billions



Sources: NHIS, Milken Institute

Combined, the productivity losses associated with the seven diseases totaled $1.1 trillion in 2003. Among the diseases, lost workdays and lower employee productivity were highest for hypertension, at $279.5 billion, driven principally by the high proportion of the population that had hypertension. Cancer had a larger impact on business output than its prevalence would indicate, due to the higher-than-average productivity losses resulting from the effects of surgery and chemotherapy.[18]

Figure 4 :: Lost Productivity by Chronic Disease, 2003

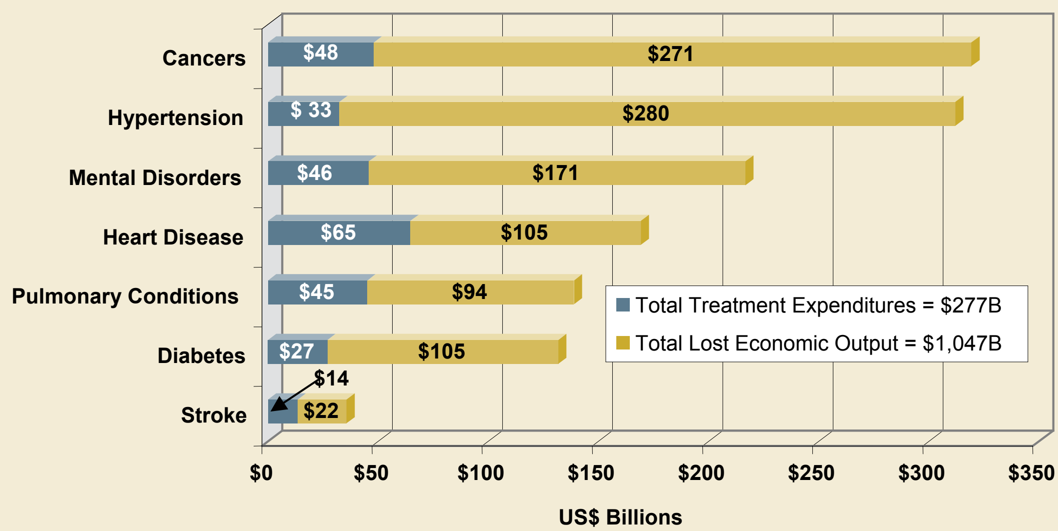


Sources: NHIS, Milken Institute

Summary: Combined Economic Impact

The economic costs of chronic disease include both direct treatment expenditures and the indirect impacts associated with lost workdays and reduced on-the-job productivity of both patients and employed caregivers. Generally, the value of these productivity losses greatly exceeds the cost of treatment. As shown in figure 5, we estimate that in 2003, the productivity losses associated with the seven diseases considered here totaled almost $1.1 trillion, while treatment expenditures totaled $277.0 billion. Together, the combined economic impact of these diseases amounted to $1.3 trillion.

Figure 5 :: Economic Impact of Chronic Disease, 2003



Sources: MEPS, NHIS, Milken Institute
Note: Treatment expenditures for individuals in nursing homes, prisons, or under other institutional care are not included. Treatment expenditures for comorbidities and secondary effects of listed diseases are also excluded.

II: Where We Are Headed: Two Potential Scenarios

Over the next twenty years, the choices we make as individuals and as a country about strategies to prevent and manage chronic disease will have an enormous impact on the nation's health and well-being. To appreciate the importance and value of acting now to prevent disease and continue to strive for health-care improvements in the most prevalent diseases, we construct two scenarios. The first is a "business-as-usual" baseline scenario that assumes current trends continue into the future. We then compare this with an optimistic scenario that assumes improvements in health due to more comprehensive prevention and lifestyle changes, as well as modest improvements in early intervention. The optimistic scenario assumes that while the population continues to age, the country takes some of the steps outlined by the Department of Health and Human Services, including improved nutrition, increased physical activity, maintenance of a healthy weight, and regular health screenings, and that there is a slight improvement in early detection, screening, and development of medical advances.[19]

Our Current Course: Baseline Projections to 2023

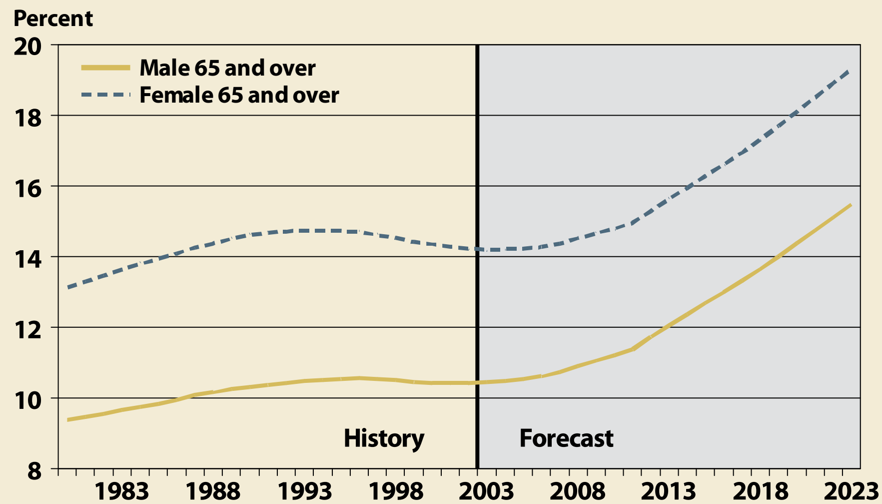
To construct our baseline projection for future rates of disease and associated treatment costs, we develop estimates assuming that current trends will continue to hold for:

- the aging population
- behavioral risk factors and other demographic influences
- improvement in early detection and medical innovation
- health-care cost changes.[20]

Because the risk of developing each of the seven diseases increases with age, the aging population is expected to drive a substantial increase in the number of cases of chronic disease over the next twenty years, even if other risk factors remain unchanged. For example, in the case of prostate cancer, the ratio of the incidence rate per 100,000 population in the 65–74 age group (936.1) to the 0–49 age group (5.6) is an astronomical 167.2, the highest of all cancers. This means that a man between 65 and 74 is 167.2 times more likely to develop prostate cancer than a male under 50. In short, prostate cancer is so common that men hope to die at an advanced age *with* the disease eventually, but not *because* of it. The U.S. Census Bureau projects a rise in the 65-and-over share of the population from 12.4 percent in 2003 to 17.4 percent by 2023 (figure 6).

Prostate cancer is so common that men hope to die at an advanced age *with* the disease eventually, but not *because* of it.

Figure 6 :: **Population Projections:** 65 and over



Source: U.S. Census Bureau

To estimate trends for future behavioral risk factors, we considered the observed trend and consulted the literature and relevant public and private experts, such as staff at the Centers for Disease Control and Prevention. Risk factors considered include overweight/obesity, smoking, alcohol consumption, physical activity, high cholesterol, air quality, and illicit drug use.

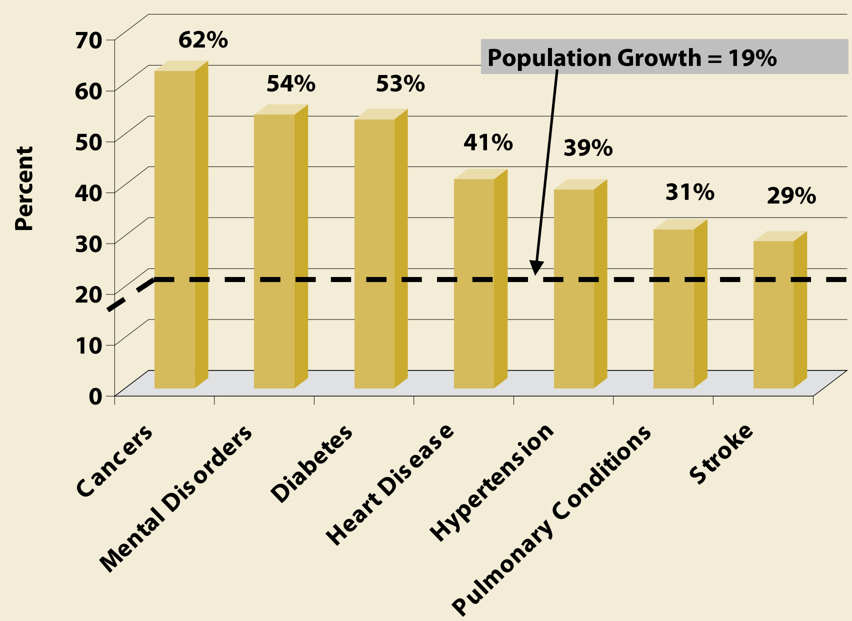
To estimate for the interplay of aging demographics and behavioral risk factors in our projections, we built pooled, cross-sectional state regression models. In these models, we explain variations in incidence and prevalence (depending on the disease statistics available) by utilizing data on demographic, behavioral, and other risk factors. In other words, we build assumptions about expected changes in such factors as race, air quality, weight, activity levels, smoking, and alcohol consumption. The statistical relationship allows an estimate of the relative importance of specific behavioral risk factors by disease.

We assume that current trends hold with regard to prevention and screening, as well as the rate of medical advances.

Rise in the Burden of Disease

Under the baseline scenario, we project a rise in the number of reported cases of the seven diseases to almost 231 million annually by 2023. As shown in figure 7, this represents an increase of 62 percent in the absolute number of cancer cases, a 54 percent increase in mental disorders, and a 53 percent increase in diabetes. The population is only projected to grow 19 percent over this twenty-year period; the excessive growth in chronic disease is caused by the aging of the population and increases in other risk factors.

Figure 7 :: Projected Rise in Cases of Chronic Diseases, 2003-2023



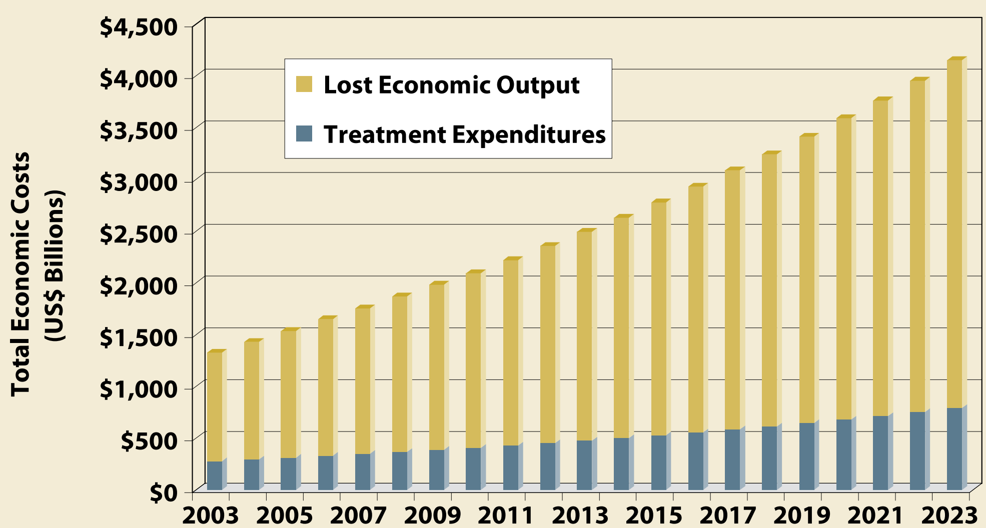
Sources: MEPS, Milken Institute

Rise in Total Costs, Including Productivity Losses and Expenditures to Treat Disease

In order to project productivity losses, we first calculate the future share of the employed adult population. Of this share, we determine the number of employed individuals reporting a particular condition. We also calculate the number of employed caregivers who suffer lost workdays and productivity for each condition. To calculate treatment costs, we multiply the number of projected cases by the estimated cost per case, projected forward by per capita medical spending growth trends developed by the Centers for Medicare and Medicaid Services.

We find that in 2023, the indirect impacts of the seven diseases total $3.4 trillion annually, more than four times the cost of treatment. As shown in figure 8, adding in the cost of expenditures to treat these diseases ($790 billion) brings the total annual economic burden associated with them to $4.2 trillion in 2023.

Figure 8 :: Current Path, Combined Value of Treatment Expenditures and Productivity Losses, 2003–2023



Source: Milken Institute

The Alternative Future: Improvements in Prevention, Behavioral Patterns, and Treatment in an Optimistic Scenario

To construct the optimistic scenario, we assume a range of reasonable improvements in prevention, behavioral patterns, and treatment relative to the baseline scenario. We develop these assumptions on the basis that the improvements are achievable. Most are modest but will require a focused, society-wide effort to be realized. The population continues to age consistent with the baseline assumptions. These assumptions include:

- **A reduction in number of obese persons.** The **baseline** obesity assumption calls for the rate of increase to moderate in relation to recent history and begin to plateau around 2015. For the **optimistic** case, we assume that obesity and overweight become a national health initiative, just as smoking cessation was a health priority in the 1970s, 1980s, and 1990s. We assume that the prevalence of overweight declines to 32.2 percent of the population by 2023, and that obesity declines to 19 percent of the population, roughly where it was in 1998.

- **A continued reduction in smoking.** Our **baseline** projects that smoking declines at the same rate it declined over the twenty years from 1985 to 2005, so that the adult smoking rate approaches 19 percent by 2023.[21] For the **optimistic** case, we assume that smoking declines at a faster rate, consistent with longer-term declines, reaching approximately 15 percent by 2023.

- **A decline in alcohol consumption.** In the **baseline** projection, we assume that the "at risk" percent of the population remains unchanged, at the 2003 percentage of 5.8 percent. In the **optimistic** scenario, we assume that the percentage of "at risk" drinking decreases steadily, to 4.2 percent.

- **Physical activity will increase.** We assume in the **baseline** projection that the percent share of the population engaged in physical activity will increase gradually, from 75.4 in 2003 to 77.9 by 2023. In the **optimistic** projection, the share of the population engaged in physical activity will have increased to 83.3 percent by 2023.

- **High cholesterol will return to 2000 levels.** We expect the percent of people with high cholesterol to stabilize around 42.2 percent by 2023 in the **baseline** projection. In the **optimistic** scenario, we assume the percentage of people with high cholesterol will decline to 31.5 by 2023, nearing 2000 levels.

- **An improvement in air quality.** In the **baseline** projection, we assume that as population growth rises, so does the demand for fuel. In the **optimistic** case, we assume that there is a net reduction in air pollution and other airborne allergens and irritants relative to underlying economic growth.

- **A gradual decline in illicit drug use.** In the **baseline** projection, we assume that illicit drug use, as a share of the total population, will plateau, due to increased awareness of the risks of drug use. In the **optimistic** projection, we assume that from 2010 onward it will embark on a downward trajectory.

- **A modest improvement in early intervention and treatment.** The **baseline** scenario assumes that historical trends in the improvement of early detection and screening continue to hold. The **optimistic** scenario assumes more uniform use of best practices in early detection and screening for the following conditions for which such mechanisms are most relevant today: colon and prostate cancer. It also assumes a very slight acceleration in the availability and use of new treatments for hypertension, heart disease, stroke, and mental disorders.

- **Lower health-care cost growth.** The **baseline** treatment spending projections assume medical inflation consistent with CMS projections. The **optimistic** scenario assumes growth rates of health-care cost that are 0.5 percentage point lower than baseline. This lower average cost reflects a host of factors that could potentially improve the efficiency of care, such as increased coordination of care for chronically ill patients, more widespread treatment to accepted guidelines, efforts to improve patient adherence to prescribed therapies, and faster adoption of health information technology. Our assumptions on improved and more widespread adoption of disease management practices act to reduce the rate of future growth of health-care costs. However, our optimistic scenario incorporates only moderate improvements in disease management practices. If greater advances in disease management practices are achieved, slower growth in health-care costs and treatment expenditures would be possible.

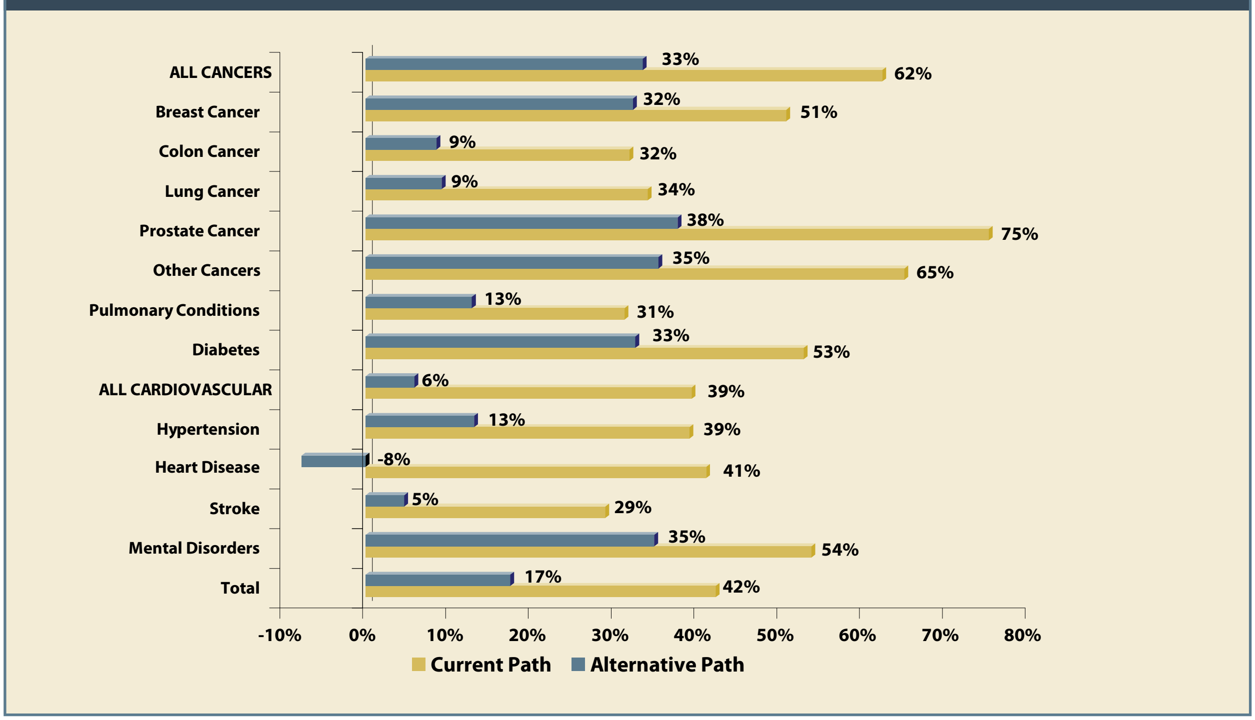
While these assumptions are optimistic, they are not beyond our reach. They address the most frequently cited behavioral risk factors and our own calculations of the statistical relationships between the risk factors and each condition. By mobilizing resources as a society, there is no reason why we cannot meet the challenge of bringing obesity levels down to where they were only a decade ago. We proved that smoking reduction was attainable and continue to educate our younger generation about its negative health-related impacts. Our underlying assumptions are based on reasonable frameworks explained in more detail in the main body of this study.

III. The Alternative Future: Avoidable Costs in the Optimistic Scenario

Avoidable Illness

Below we summarize projected rates of reported cases for each of the seven diseases, including specific types of cancer. We also compare projections based on current (baseline) trends and the optimistic scenarios. Across all seven diseases, we estimate that the number of cases can be reduced by more than 40 million (from 230.7 million to 190.5 million). This represents an increase of only 17 percent over twenty years, compared to the baseline projection of 42 percent. The largest difference is for the population reporting heart disease, where the absolute number of cases falls by 8 percent in the optimistic scenario, compared to a 41.1 percent increase in the baseline projection.

Figure 9 :: Percent Growth in Number of People Reporting Chronic Diseases, 2003-2023: Current Path versus Alternative Path



Sources: MEPS, Milken Institute

Brief descriptions follow of the key factors we expect will drive the trend in each disease. We focus mainly, although not exclusively, on *behavioral* risk factors because the scientific evidence shows that behavioral changes can yield predictable results that are relatively easy to quantify. For each condition, there may be a host of other factors in addition to those identified, including heredity, stress, and more environmental and behavioral factors. The risk factors identified were chosen according to a thorough review of the literature and availability of state-level data.

Breast Cancer

Current Path: The aging population and rising obesity rates will likely tip recent reductions in breast cancer incidence back to an upward trajectory. In the current path (*baseline scenario*), cases will increase by 50.8 percent between 2003 and 2023, 11.3 percentage points greater than the impact of aging alone.

Alternative Path: The principal source of variance between projections in the current and alternative path (*optimistic scenario*) is a lower projected trend for obesity. Cases grow by 32.2 percent from 2003 to 2023, resulting in 12.3 percent fewer breast cancer cases.

Colon Cancer

Current Path: Again, an aging population and obesity trends push colon cancer cases higher, but an expected decline in smoking and more widespread screening limit the increase. The projection calls for cases to increase to 447,000 (a 31.8 percent gain) between 2003 and 2023, or 19.4 percentage points below where aging alone would push the total.

Alternative Path: Increased screening, greater reductions in "at risk" smoking (defined as smoking at least 100 cigarettes over the course of a lifetime and still smoking), and obesity declines related to increased physical activity combine to produce 79,000 fewer cases (17.7 percent fewer) in 2023 in the *optimistic* scenario compared to the *baseline* trend.

Lung Cancer

Current Path: While the aging of the population will drive lung cancer rates up, expected continued declines in smoking will offset much of the impact of aging. The number of lung cancer cases is projected to increase 34 percent from 2003 to 2023, or 21.9 percentage points below the projection attributable to aging alone.

Alternative Path: While it is not the sole cause of lung cancer, smoking has a stronger statistical relationship with lung cancer than with any other cancer or chronic disease. We therefore focus on this behavioral risk factor as a key driver of cases of lung cancer. Lower smoking rates in the *optimistic* scenario result in 92,000 fewer cases of lung cancer (18.4 percent fewer) in 2023 than in the *baseline*.

Prostate Cancer

Current Path: Increased screening has led to earlier detection and improved survival rates in recent years, but aging demographics and higher obesity rates push incidence and cases higher over the next two decades. The projection calls for cases to increase by 75.4 percent (786,000).

Alternative Path: Increased physical activity, lower obesity rates, and an increase in early screening for prostate cancer together produce 393,000 fewer cases (21.5 percent) in 2023 in the *optimistic* scenario than in *baseline* projections in 2023.

Other Cancers

Current Path: Skin cancer is the most prevalent of "other cancers," but liver, kidney, brain, bladder, and uterine cancer, and leukemia are also significant. Obesity is expected to have a detrimental impact on future cases. To a lesser extent, high cholesterol will play a role. Reductions in smoking rates will partly offset rising obesity rates. Cases increase by 65.1 percent between 2003 and 2023, or 20.8 percentage points above where aging alone would send the total.

Alternative Path: Lower smoking, cholesterol, and obesity rates cut rates for other cancers in the *optimistic* scenario. Other cancer cases are reduced by 2.3 million (18 percent) due to these behavioral changes.

Pulmonary Conditions

Current Path: The net effects of an aging population, changing racial demographics, and worsening air quality lead to increased incidence of pulmonary conditions. Combined, these forces cause pulmonary conditions cases to increase by 31.3 percent, or 4.1 percentage points greater than where aging alone would push the total.

Alternative Path: The principal sources of variance between the current and alternative case scenarios are lower projections for smoking prevalence and average air quality. Cases grow by 12.8 percent between 2003 and 2023, resulting in 9.1 million fewer cases

Diabetes

Current Path: The obesity epidemic will have the greatest and most direct effect on diabetes cases. Diabetes cases are projected to increase 52.9 percent from 2003 to 2023, or 12.2 percentage points more than that solely attributable to aging.

Alternative Path: The major difference between the *optimistic* and *baseline* diabetes cases is the assumption of lower obesity rates. Diabetes cases would increase by 32.6 percent from 2003 to 2023. This results in 13.3 percent (2.8 million) fewer cases.

Hypertension

Current Path: Moderately higher exercise frequency will tend to counteract rising obesity rates. Exercise can mitigate hypertension to a significant extent. This projection calls for cases to increase by 39.1 percent between 2003 and 2023, just higher than where aging alone would push the total.

Alternative Path: Because hypertension is preventable, changes in obesity and exercise levels could prevent the rapid progression of prevalence. The *optimistic* scenario, based on these changes, as well as a slight improvement in treatment, results in 9.6 million fewer (18.7 percent) hypertension cases in 2023. In this scenario, we estimate that the prevalence rate will peak in 2010 and decline moderately thereafter.

Heart Disease

Current Path: Population aging and obesity are likely to cause an increase in heart disease cases in the absence of significant behavioral changes. Lower smoking mitigates some of the possible increase. The projection calls for cases to increase by 41.1 percent between 2003 and 2023, slightly above where aging alone would place the total. Heart disease cases reach 27.0 million.

Alternative Path: Fortunately, changes in behavioral risk factors could significantly alter the path of heart disease. We assume that a slight improvement in drug therapies will play a modest role, too. The *optimistic* scenario contains 9.4 million fewer (34.6 percent) cases in 2023. Here the prevalence rate falls during the projection period, in contrast to a steady increase in the baseline.

Stroke

Current Path: Of all behavioral risk factors, smoking has the strongest causal impact on stroke. The projection shows cases increasing by 28.9 percent between 2003 and 2023, slightly above where aging by itself would place it. Stroke cases increase to 3.1 million. (Note that these estimates do not include strokes among the institutionalized population).

Alternative Path: Lower smoking rates, changes in obesity and exercise levels, and an increase in early intervention to reduce stroke risk could prevent many strokes. The *optimistic* scenario has 589,000 fewer (18.8 percent) cases in 2023. It projects that the prevalence rate will decline slowly over the period.

Mental Disorders

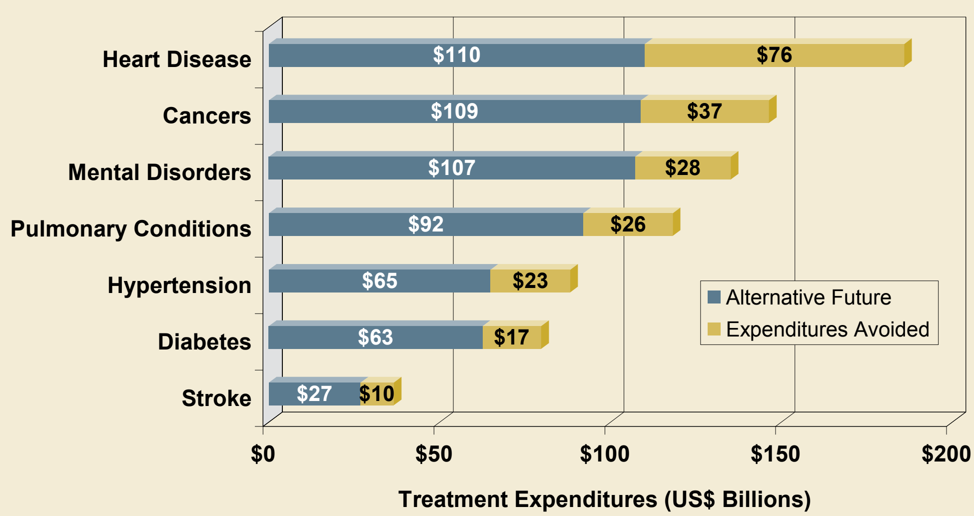
Current Path: The term "mental disorders" encompasses a wide range and variety of conditions, including, for example, both major and mild depression, bipolar disorder, schizophrenia, and various anxiety disorders, such as panic, obsessive-compulsive disorder, and phobias. Approximately 26.2 percent of Americans over 18 suffer from one or more mental disorders during a given year. By 2023, we project roughly 46.7 million cases, or 53.8 percent more than in 2003.

Alternative Path: While the origins of most mental disorders are complex and may have a hereditary or environmental component, behavioral factors can also affect the prevalence and severity of these conditions. We estimated the impact on the rate of mental disorders of two such factors—alcohol consumption and illicit drug use—for which data were rich and readily available. In the *optimistic* scenario, lower "at risk" alcohol consumption and illegal drug use helps reduce the prevalence by approximately 5.8 million cases by 2023 compared to *baseline*. Even so, the prevalence rate will follow an upward trend throughout the projection period.

Avoidable Treatment Expenditures

If fewer people suffered from chronic conditions, the country would spend far less on health care. To estimate the health-care spending that could be avoided by reducing the prevalence of chronic illness, we first project the 2003 expenditure per case out to 2023 (by applying growth rates in health-care costs). By applying this expenditure per case to the projected population with the condition, we can obtain total expenditure projections for the twenty-year period. The baseline projection calls for an annual growth rate in the health-care cost index of 3.4 percent, while the optimistic projection uses a rate 0.5 percent lower. This optimistic path would still result in health-care cost index increasing nearly 1.0 percentage point faster than overall inflation.

Figure 10 :: Avoidable Treatment Expenditures, 2023



Source: Milken Institute

As discussed previously, our assumptions on the reduction in health-care cost growth attributable to improved disease management practices, early screening, and intervention in the optimistic scenario are modest. For example, more widespread breast self-examination or improved diagnostics would catch breast cancer at an earlier stage, when less-aggressive treatments are available, and reduce the growth in expenditures to treat patients. In the case of asthma (included in pulmonary conditions), improper management can lead to frequent hospitalizations and result in higher treatment expenditures. Improved disease management of diabetes can lessen the risk factors for developing cardiovascular disease and other conditions.

We estimate that more effective prevention and management of disease could save $218 billion in treatment expenditures annually in 2023 in the optimistic scenario. These avoidable treatment costs, $1.6 trillion over the period, can be attributed to changes in behavior, preventative measures, and innovation. To put this into perspective, such a savings—or a loss, depending on how we face the issue—is nearly double the size of India's economy. Or twenty-one times the Department of Education budget.

We find that breast cancer treatment expenditures drop 20.6 percent ($3.2 billion) in the optimistic scenario; colon cancer expenditures decline by 25.5 percent ($2.7 billion); prostate cancer expenditures fall 28.9 percent ($4.1 billion); lung cancer expenditures are down 26.2 percent ($4.2 billion); and expenditures for other cancers fall 25.8 percent ($23.1 billion). Treatment costs for all cancers are 25.6 percent ($37.4 billion) less in the optimistic scenario. The *cumulative* difference through 2023 between the optimistic and baseline scenarios is $22.3 billion for breast cancer; $21.7 billion for colon cancer; $27.2 billion for prostate cancer; $32.4 billion for lung cancer; and $168.5 billion for other cancers. In the optimistic scenario, all cancers total $272.0 billion lower on a cumulative basis.

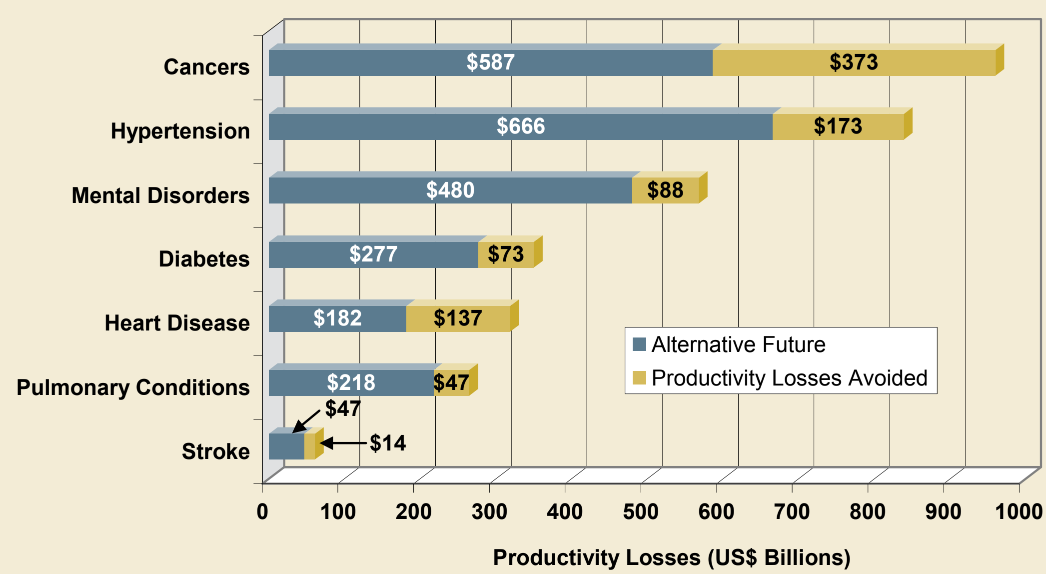
In 2023, treatment expenditures for pulmonary conditions are 22.2 percent ($26.2 billion) lower in the optimistic scenario. They drop 20.7 percent ($28.0 billion) for mental disorders; 21.5 percent ($17.1 billion) for diabetes; 40.8 percent ($75.8 billion) for heart disease; 26.4 percent ($23.3 billion) for hypertension; and 26.5 percent ($9.7 billion) for stroke. The *cumulative* difference over the projection interval for pulmonary conditions is $199.6 billion; $196.6 billion for mental disorders; $118.5 billion for diabetes; $561.7 billion for heart disease; $179.6 billion for hypertension; and $72.7 billion for stroke.

Potential to Avoid Lost Productivity

Baseline and optimistic scenarios help convey the forgone economic output attributable to lost workdays and productivity. As before, the estimate of future productivity losses will be the difference between the two scenarios.

National projections show a difference in the baseline and optimistic scenarios (based on GDP) of $905 billion (26.9 percent) in 2023. Figure 11 provides a comparison of the scenarios for *total* productivity losses. The productivity loss from cancer is $373 billion (38.9 percent) lower in the optimistic scenario. Similarly, the productivity loss for heart disease is $137 billion (43 percent) lower. The *cumulative* difference between the projections is $6.9 trillion (16.1 percent).[22]

Figure 11 :: Avoidable Productivity Losses, 2023



Source: Milken Institute

Summary: Combined Impact of Avoidable Treatment Expenditures and Productivity Losses (Economic Output)

Under the optimistic scenario, we estimate that the prevalence of chronic illness could be reduced substantially, leading to a dramatic reduction in treatment expenditures and avoiding a total loss of up to $1.1 trillion annually by 2023, a 27 percent difference (see figure 12).

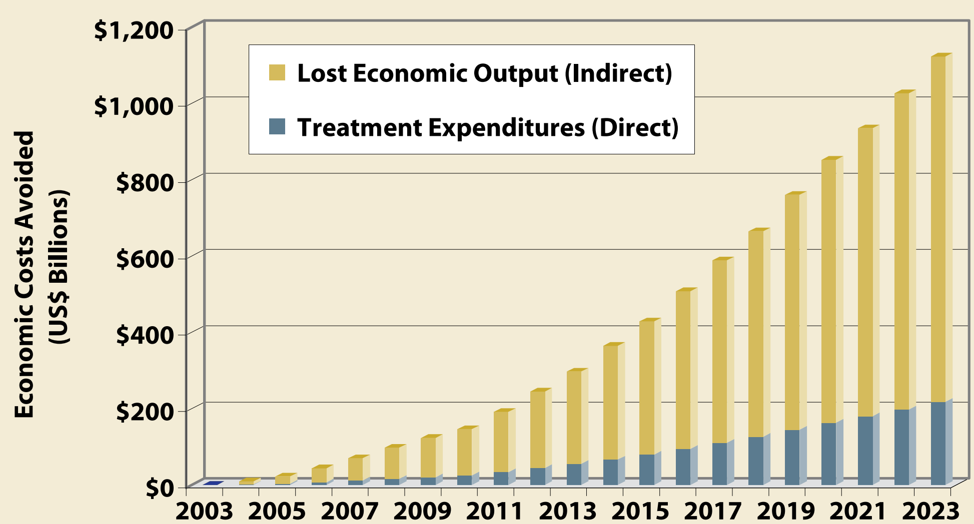
Figure 12 :: Projected Annual Costs of Chronic Diseases, 2023
US$ Trillions

	Current Path	Alternative Path	Avoided Costs: Amount	Avoided Costs: Percent
Treatment Expenditures	0.8	0.6	0.2	27.8
Lost Economic Output	3.4	2.5	0.9	26.8
Total	4.2	3.1	1.1	27.0

Source: Milken Institute

The following chart illustrates the total avoided costs over a twenty-year interval (from 2003 through 2023). The last bar in 2023 portrays the avoided costs (amount) figures from the table above.

Figure 13 :: Costs That Can Be Avoided, 2003-2023



Source: Milken Institute

Importance of Behavioral and Environmental Risk Factors: Spotlight on Obesity and Smoking

We find that the single most important way to reduce the burden of disease and reduce costs to society is to reduce obesity, closely followed by continuing to achieve reductions in smoking prevalence. Obesity is a key risk factor for many diseases and a key contributor to disability. For example, a RAND study finds that if obesity trends continue unchecked, disability rates will climb across all age groups, offsetting past reductions in disability.[23] RAND estimates that if current trends continue, one-fifth of health-care expenditures would be devoted to treating the consequences of obesity by 2020.

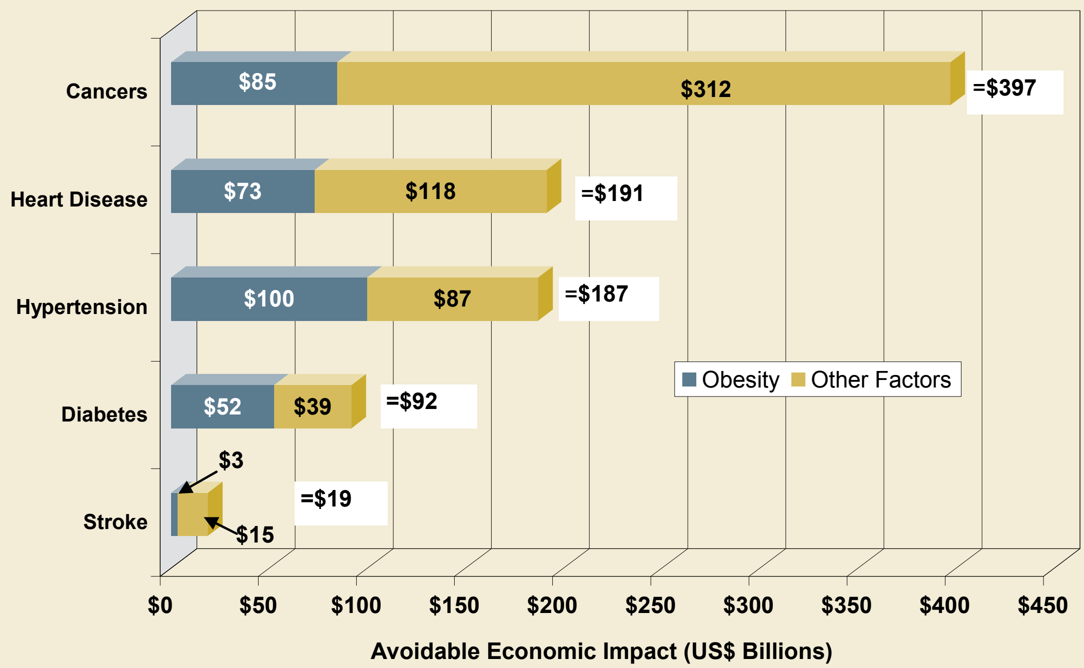
Based on our analysis, if the country could reverse the growth rate of obesity and return to 1998 levels in 2023, the impact would be close to 15 million fewer reported cases compared to baseline (a reduction of 14 percent) of the seven diseases studied. This would translate to a reduction in health-care spending of $60 billion and an increase in productivity of $254 billion, and account for a large proportion of the overall economic impact.

Lower obesity rates have the largest effect in reducing the total number of cases for hypertension (5.7 million, or 12 percent). They could reduce reported cases for heart disease by 4.4 million (20.4 percent) and for diabetes by 2.8 million (13.3 percent). Reducing obesity would result in the largest percent decline in the total number of prostate cancer cases (up to 22 percent).

Figure 14 displays the differences in total treatment costs and lost economic output between the two scenarios attributable to obesity versus other factors. (Note that the total avoidable costs reflected in figure 14 are lower than those described elsewhere in this report because they exclude avoidable-cost growth related to assumptions about differences in the growth of health-care costs.) We are showing the avoidable costs that are attributable to fewer cases of these chronic diseases so that they can be linked back to their underlying causes.

The lowered obesity assumption in the optimistic scenario reduces treatment expenditures and improves productivity for hypertension by a combined $100.1 billion ($8.9 billion and $91.2 billion, respectively), the largest *absolute* impact. This is followed by cancer, at $84.6 billion (treatment expenditures of $12.4 and higher productivity of $72.2); heart disease at $73.2 billion ($27.6 billion for treatment expenditures and $45.6 billion for productivity); diabetes at $52.4 billion ($9.6 billion for treatment expenditures and $42.8 billion for productivity); and stroke at $3.3 billion ($1.2 billion for treatment expenditure and $2.1 billion for productivity).

Figure 14 :: Avoidable Economic Costs Attributable to Decline in Obesity, 2023



Source: Milken Institute

We perform a similar analysis for the risk factor smoking. The greatest *absolute* difference in cases in 2023 is seen for pulmonary conditions, at 7.3 million. However, the largest *percentage* difference is for lung cancer, at 18.4 percent. Heart disease cases ease by 1.35 million (7.1 percent), and cases for other cancers decline by 480,000 (4.4 percent) due to lower smoking. In total, cases are reduced by 9.6 million, or 9.0 percent, with the lower assumption.

Lower smoking in the optimistic scenario cuts expenditure on pulmonary conditions by $12.0 billion. Heart disease ranks second, at $8.4 billion; stroke is third, at $4.2 billion; other cancers come in fourth, at $3.0 billion; and all cancers see expenditures cut by $6.7 billion in 2023. In total, the optimistic assumption sees expenditures fall by $31.4 billion, or 9.0 percent, and accounts for nearly 23 percent of the overall difference attributable to behavioral, screening and medical innovation. The increase in productivity due to lower smoking is $79.0 billion.

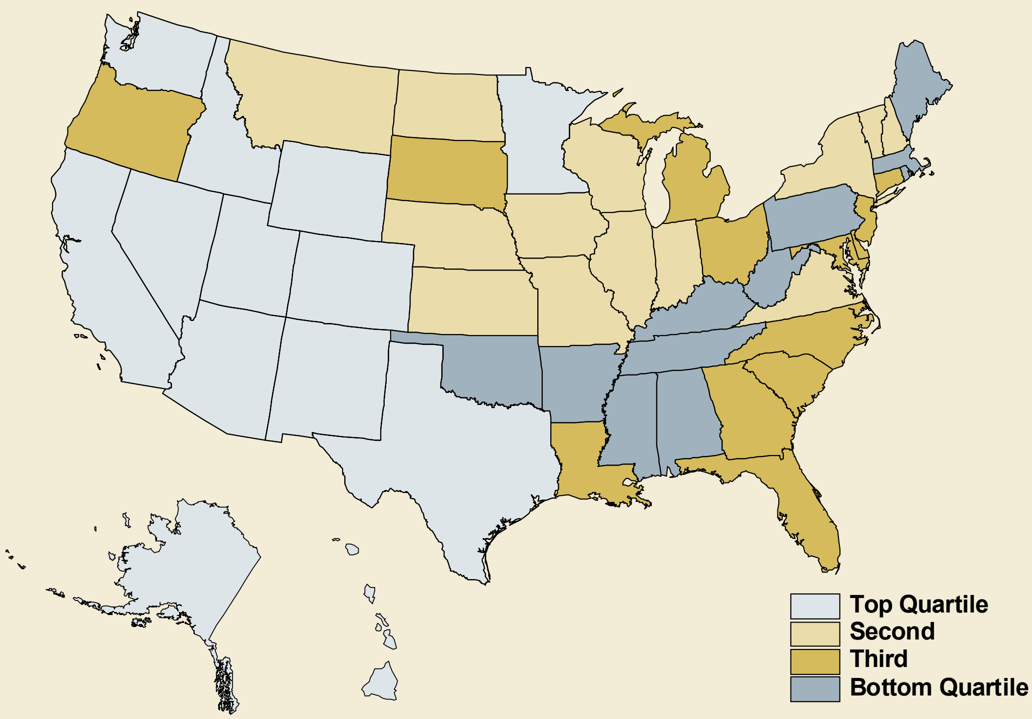
IV. Impact of Chronic Disease at the State Level

Chronic Disease Index

The prevalence of various chronic diseases and their economic impacts vary by state. To assess the burden of chronic disease across all states, we create a State Chronic Disease Index. We estimate the number of the state's population reporting each of the conditions on a per capita basis, and then benchmark each state to the state with the lowest rate. That state is assigned a composite value of 100. Thus, a state with a value of 70 means that the rate at which its population reports having one of these conditions is 30 percent worse off than the state with the healthiest population. The following map and table display the results.

The least healthy states lie in a belt of obesity and smoking that runs from the Northeast through Oklahoma.

Figure 15 :: State Chronic Disease Index



Note: States in the top quartile have the lowest rates of seven common chronic diseases.
Source: Milken Institute

Figure 16 :: State Chronic Disease Index*

State	Rank	Composite Score	State	Rank	Composite Score
Utah	1	100.00	Vermont	26	75.62
Alaska	2	96.58	Maryland	27	75.05
Colorado	3	95.29	Michigan	28	74.82
New Mexico	4	93.50	Ohio	29	74.71
Arizona	5	91.50	Oregon	30	74.48
California	6	89.83	Georgia	31	74.12
Hawaii	7	88.38	New Jersey	32	74.10
Idaho	8	87.68	North Carolina	33	74.08
Washington	9	86.43	Connecticut	34	73.28
Wyoming	10	83.13	Delaware	35	73.18
Minnesota	11	82.59	South Dakota	36	72.20
Texas	12	82.26	Louisiana	37	70.55
Nevada	13	80.80	Florida	38	70.15
North Dakota	14	80.64	South Carolina	39	68.76
Illinois	15	80.04	Massachusetts	40	68.65
Kansas	16	79.87	Alabama	41	68.59
Nebraska	17	79.61	Oklahoma	42	67.76
New Hampshire	18	79.29	Maine	43	67.60
Montana	19	79.05	Rhode Island	44	66.76
Virginia	20	77.68	Pennsylvania	45	66.37
Wisconsin	21	77.29	Mississippi	46	66.17
New York	22	77.26	Kentucky	47	65.98
Indiana	23	77.14	Arkansas	48	65.68
Iowa	24	76.91	Tennessee	49	65.31
Missouri	25	76.12	West Virginia	50	62.19

*Based upon national and regional totals from MEPS, proportioned to states, using NCI and CDC data.
Sources: MEPS, BRFSS (CDC), NCI, Milken Institute

This state-level data demonstrates linkages between risk factors and disease prevalence. Smoking, alcohol abuse, poor diet, and lack of exercise tend to be more common in states with high rates of certain diseases. State demographics and urbanization also influence disease rates; for example, urban pollution shows a statistically demonstrable impact on lung disorders. Ethnic composition plays a role, as do levels of record-keeping and reporting, and the rate at which people visit doctors. States that rank low tend to have the worst readings on behavioral risk factors, the highest percentage of elderly residents, and a demographic mix predisposed to one or more chronic diseases.

The least healthy states lie in a belt of obesity and smoking that runs from the Northeast through Oklahoma. West Virginia ranks as the least healthy state in the union. Tennessee (49th), Arkansas (48th), Kentucky (47th), and Mississippi (46th) also fare poorly. Western states score among the healthiest, led by Utah, Alaska, Colorado, New Mexico, and

Arizona. The low scores for Massachusetts and Maine result from the high incidence of cancers and, perhaps, better reporting rates. In June 2007, a study from the New England Healthcare Institute, *The Boston Paradox: Lots of Health Care, Not Enough Health,* concluded that despite having one of the leading health-care clusters in the world, Boston's residents have a surprisingly high prevalence of several types of cancers and other chronic diseases.[24]

We find that all states stand to gain in the 2023 optimistic scenario (see figure 17) , with even the less populous states, such as Alaska, avoiding 79,000 cases of chronic disease (a 16.4 percent reduction) and achieving benefits of $2.6 billion (27.0 percent) through lower treatment costs and higher productivity. Iowa avoids 351,000 cases and gains $9.9 billion in economic benefit. New Hampshire avoids 183,000 cases and gains $5.2 billion in lower treatment costs and higher levels of economic activity. Among more populous states, California avoids 4.3 million (17.6 percent) cases of chronic disease and gains $117.1 billion (27.1 percent) through lower treatment costs and higher productivity in 2023. Texas eliminates 3.2 million cases and gains $90.2 billion in economic benefit. New York benefits in a major way as well, avoiding 2.3 million cases and achieving economic benefits of $63.8 billion.

Figure 17 :: Avoidable Costs by State

Year	Number of Cases of Chronic Disease (Thousands)			Economic Burden of Chronic Disease (Direct + Indirect) (US$ Billions)		
	Total Cases, Current Path	Avoided Cases, Alternative Path	Percent Cases Avoided in 2023*	Total Burden, Current Path	Avoided Burden, Alternative Path	Percent of Economic Burden Avoided in 2023*
U.S. TOTAL**	230,724	-40,196	-17.4	4,153	-1,123	-27.0
Alabama	3,816	-681	-17.8	67	-18	-27.0
Alaska	482	-79	-16.4	10	-3	-27.0
Arizona	5,542	-944	-17.0	97	-26	-26.3
Arkansas	2,311	-410	-17.8	42	-12	-27.9
California	24,245	-4,258	-17.6	431	-117	-27.2
Colorado	2,972	-495	-16.6	55	-15	-26.9
Connecticut	2,531	-437	-17.3	44	-12	-26.6
Delaware	715	-127	-17.8	14	-4	-28.1
Florida	18,322	-3,247	-17.7	337	-91	-26.9
Georgia	7,791	-1,333	-17.1	138	-37	-26.9
Hawaii	785	-136	-17.3	15	-4	-26.4
Idaho	1,063	-183	-17.2	20	-5	-27.3
Illinois	8,407	-1,479	-17.6	150	-41	-27.1
Indiana	4,628	-808	-17.5	82	-22	-26.8
Iowa	1,967	-351	-17.9	36	-10	-27.3
Kansas	1,917	-335	-17.5	34	-9	-26.8
Kentucky	3,655	-638	-17.5	64	-18	-27.7
Louisiana	3,417	-612	-17.9	63	-17	-27.5
Maine	1,198	-204	-17.0	22	-6	-26.8
Maryland	4,584	-787	-17.2	81	-22	-27.4
Massachusetts	5,412	-893	-16.5	95	-25	-25.9
Michigan	7,984	-1,400	-17.5	135	-36	-26.9
Minnesota	3,944	-651	-16.5	74	-19	-26.2
Mississippi	2,458	-446	-18.2	46	-13	-28.1
Missouri	4,461	-794	-17.8	81	-22	-27.2
Montana	715	-123	-17.2	13	-4	-26.9
Nebraska	1,190	-206	-17.3	22	-6	-27.0
Nevada	2,222	-381	-17.1	44	-12	-27.4
New Hampshire	1,052	-183	-17.4	19	-5	-27.5
New Jersey	6,118	-1,087	-17.8	113	-31	-27.4
New Mexico	1,338	-232	-17.3	24	-6	-26.4
New York	12,697	-2,283	-18.0	232	-64	-27.5
North Carolina	7,786	-1,328	-17.1	140	-38	-26.8
North Dakota	399	-73	-18.3	8	-2	-27.9
Ohio	8,406	-1,473	-17.5	152	-40	-26.6
Oklahoma	2,763	-496	-17.9	48	-13	-27.7
Oregon	3,090	-506	-16.4	55	-14	-25.8
Pennsylvania	9,666	-1,690	-17.5	170	-45	-26.6
Rhode Island	914	-157	-17.2	16	-4	-26.5
South Carolina	3,797	-660	-17.4	71	-19	-27.1
South Dakota	575	-101	-17.6	11	-3	-27.6
Tennessee	5,394	-944	-17.5	99	-27	-27.5
Texas	18,641	-3,210	-17.2	332	-90	-27.2
Utah	1,723	-279	-16.2	30	-8	-26.0
Vermont	539	-92	-17.1	10	-3	-26.9
Virginia	6,224	-1,068	-17.2	109	-30	-27.3
Washington	4,231	-746	-17.6	80	-23	-28.2
West Virginia	1,591	-285	-17.9	28	-8	-27.2
Wisconsin	4,389	-752	-17.1	80	-21	-26.5
Wyoming	342	-61	-17.9	7	-2	-27.9

* Percentage differences in the baseline and optimistic state changes are small because the rate of change in projections for behavioral risk factors are similar.

** District of Columbia is included.

Source: Milken Institute

V. Long-Term Economic Impact: Forgone Growth

The preceding estimates of economic impact place a monetary value on the productivity losses associated with seven specific chronic disease categories and the share of these losses that could be prevented with improved health.

We now ask a different question: How much could we improve the nation's total economic output over the long term if we improve the health of the population? This analysis differs from the simpler estimates of lost productivity because it takes into account the intergenerational impacts of chronic disease and looks at these impacts in real (inflation-adjusted) terms.

Our goal is to assess the longer-term implications of poor health on the economy. Economic growth depends on the stock of human capital (a healthy and well-trained work force) and the flow of investments into education and work-based learning and training procedures. Economic Nobel Prize winner Gary Becker offers an insightful summation of the way knowledge drives innovation:

> "The continuing growth in per capita incomes of many countries during the nineteenth and twentieth centuries is partly due to the expansion of scientific and technical knowledge that raises the productivity of labor and other inputs in production. The increasing reliance of industry on sophisticated knowledge greatly enhances the value of education, technical schooling, on-the-job training, and other human capital."[25]

There has been little research to quantify the impact of poor health (chronic disease) on human and physical capital formation, or the restrictions this imposes on U.S. economic growth. Existing estimates of health's economic impact also tend to ignore the productivity growth that occurs in the long term, as returns on human capital investment accrue to subsequent generations.

Building on the twenty-year projections, we develop a multivariate analysis to assess the long-term impact on the U.S. GDP. We incorporate the intergenerational effects of health on workforce productivity. To do this, we take advantage of state-level data on economic output, chronic disease, and health status to establish the relationships between health, education, and economic growth. Using this data, we estimate how inputs—such as labor or capital—are converted to outputs of real, inflation-adjusted GDP. We account for differences among states through the use of fixed effects (factors unique to each state). This calculation, known as a production function, is able to explain more than 99 percent of the variations in real GDP growth between states, a high degree of explanatory power.

Our production function analysis incorporates the following factors as contributors to economic growth[26]:

- **Life expectancy:** Life expectancy at age 65 reflects the cumulative lifetime investment in health and is therefore particularly applicable to chronic diseases.[27] Greater investments in health and lifestyle result in greater sustained labor force numbers and higher workforce quality.
- **Education:** We look at the adult population with a bachelor's degree or greater. As noted, improvements to life expectancy increase future decisions to invest in education. This allows us to develop estimates of the intergenerational relationship between health, human capital, and economic growth.
- **Labor force size:** Those employed or actively seeking employment.
- **Capital stock:** The amount of equipment, machinery, and buildings in the economy.

We also ask how future generations would be affected by current decisions. An innovation from our research is the recognition of the dynamic feedback between health and multiple independent variables over time. The lag between improvements in health and its subsequent impact on investments in human and physical capital is more fully captured using intergenerational impacts than with the production function alone.

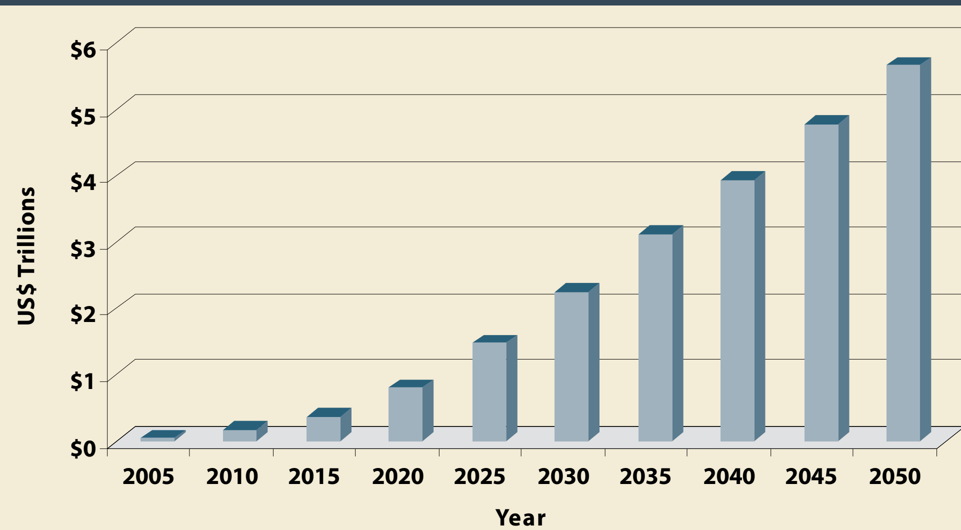
We estimate the long-term effects of investments in health and human capital by using state-level data to develop long-run elasticity estimates for labor, capital, and education that magnify the effects of improved health.[28] Please refer to the full study for a complete explanation.

Once more, we build two scenarios—baseline and optimistic—for each state, assuming in the former that current trends continue and, in the latter, that improvements take place in disease prevention, screening, and treatment. For the baseline scenario, we assume life expectancy trends consistent with the baseline chronic disease projections presented earlier. In the optimistic scenario, however, we find that the embedded investments in improved health in this generation pay off in higher real and nominal GDP levels in the middle of the century. Critically, the optimistic scenario finds that life expectancy at age 65 increases by about 0.7 year by 2023, and by 2050 it will increase 1.7 years above the baseline projection.

We then project U.S. GDP through 2050 under the baseline and optimistic scenarios. Using this method, we find that the optimistic scenario returns an impact even larger than the productivity impact estimates presented earlier. This analysis shows that potential increased economic output grows to $5.7 trillion in real terms in 2050, or a difference of 17.6 percent. Through 2050, this represents a difference slightly greater than 0.3 percent in the annual growth rate of the national economy (over the past twenty years, the annual growth rate of GDP has averaged 3.0 percent).

Figure 18 :: **Forgone Economic Output, 2005-2050**

Change in Real GDP Between Baseline and Optimistic Scenarios



Source: Milken Institute

Our findings suggest that unless projections of economic performance account for the interaction of health and other variables, they are likely to result in an underestimation of future GDP—by double-digit percentages. Further research on the dynamic interaction between health and human and physical capital is warranted.

VI. Implications

This report quantifies the staggering costs for the national economy, and to employers, of failing to address the rising costs of chronic disease. It differs from the majority of research, which generally addresses the costs of specific diseases for individuals, government programs, or society as a whole.

While our focus on aggregate economic impact dictates a different methodological approach, our results are generally consistent with other published estimates for treatment expenditures and productivity losses. Our findings on the long-term impacts of improvements in health are also consistent with the few published studies of this kind. A study by Murphy and Topel, for example,[29] found even more dramatic savings, concluding in 2003 that a 10 percent reduction in mortality from heart disease would have a value of $5.5 trillion to current and future generations, while a 10 percent reduction in mortality from cancer would be worth $4.4 trillion.

Good health is an investment in economic growth.

The clear implication of our findings is that good health is an investment in economic growth**.** The United States faces an increasingly competitive global economy, and our national economic performance is closely tied to our ability to maintain the best-educated, most highly trained, and healthiest work force. While it is well understood among policy-makers that economic growth is dependent on investments in human capital, the importance of good health in maintaining a competitive work force is frequently ignored. Better health leads to greater investments in education, resulting in higher levels of human capital—which in turn causes wealth to increase in a virtuous cycle of economic growth.

During the past twenty-five years, the United States has made remarkable progress in reducing death and disability attributable to many chronic diseases. Behavioral changes—especially the reduction in smoking—and early screening and innovations in medical technology and interventions are responsible for the improvement. Yet much remains to be accomplished to diminish the deleterious impacts on the quality and length of life. To that end, we offer two recommendations for change:

- **The incentives in the health-care system should promote prevention and early intervention.** Employers, insurers, governments, and communities need to work together to develop strong incentives for patients and health-care providers to prevent and treat chronic disease effectively. In many respects, we've received what we paid for: a tiny fraction of health-care spending is devoted to the promotion of healthier behavior, despite the fact that preventable chronic diseases are linked to smoking, obesity, lack of exercise, and drug and alcohol use.

- **As a nation, we need to renew our commitment to achieving a "healthy body weight."** Increasing obesity rates threaten to send treatment costs for diabetes and related conditions, such as heart disease and stroke, soaring over the next twenty years. There needs to be a strong, long-term national commitment to promote health, wellness, and healthy body weight.

The rise in chronic disease is costing us lives, quality of life, and prosperity. Our current health-care debates focus primarily on the extension of coverage and the design of efficient financing mechanisms. Equal attention should be paid to addressing the rising rates of chronic illness that will sap our productivity and drive our health-care costs needlessly higher. Our results show that even modest reductions in the burden of disease would yield dividends not just in lower health-care costs, but in higher productivity and economic output.

Our analysis should be seen as a contribution toward a sorely needed national discussion on health-care spending and chronic disease. The rise in chronic disease is an under-appreciated factor in pushing health-care costs higher. Further research will add additional precision and knowledge on the multiple personal, societal, and economic costs of chronic disease, as well as opportunities to reduce or avoid these costs.

Figure 19 :: Summary of Treatment Expenditures and Lost Economic Output

Selected Chronic Disease	2003				2023 -- Current Path				2023 -- Alternative Path				Avoidable in 2023			
	Population Reporting Condition (Millions)	Treatment Expenditures (US$ Billions)	Lost Economic Output (US$ Billions)	Total Economic Impact (US$ Billions)	Population Reporting Condition (Millions)	Treatment Expenditures (US$ Billions)	Lost Economic Output (US$ Billions)	Total Economic Impact (US$ Billions)	Population Reporting Condition (Millions)	Treatment Expenditures (US$ Billions)	Lost Economic Output (US$ Billions)	Total Economic Impact (US$ Billions)	Population Reporting Condition (Millions)	Treatment Expenditures (US$ Billions)	Lost Economic Output (US$ Billions)	Total Economic Impact (US$ Billions)
Cancers	10.6	48.1	271.2	319.3	17.2	146.3	959.6	1,105.9	14.1	108.9	586.5	695.4	3.1	37.4	373.1	410.4
Breast Cancer	1.1	5.5	30.8	36.3	1.7	15.6	102.3	117.8	1.5	12.4	66.6	79.0	0.2	3.2	35.6	38.8
Colon Cancer	0.3	3.9	21.9	25.8	0.4	10.6	70.4	81.0	0.4	7.9	42.7	50.6	0.1	2.7	27.7	30.4
Lung Cancer	0.4	6.3	35.3	41.6	0.5	16.1	105.9	122.0	0.4	11.9	63.9	75.8	0.1	4.2	42.0	46.2
Prostate Cancer	1.0	4.3	23.8	28.1	1.8	14.2	93.4	107.6	1.4	10.1	54.6	64.7	0.4	4.1	38.8	42.9
Other Cancers	7.7	28.0	159.4	187.4	12.7	89.7	587.7	677.4	10.4	66.6	358.7	425.3	2.3	23.1	228.9	252.0
Pulmonary Conditions	49.2	45.2	93.7	138.9	64.6	118.2	265.4	383.6	55.5	92.0	218.3	310.3	9.1	26.2	47.1	73.3
Diabetes	13.7	27.1	104.7	131.8	21.0	79.7	350.1	429.9	18.2	62.6	277.5	340.0	2.8	17.1	72.7	89.8
Cardiovascular Diseases	58.3	110.8	406.3	517.1	81.3	310.7	1,219.0	1,529.7	61.8	201.8	895.1	1,096.9	19.5	108.9	323.9	432.8
Hypertension	36.8	32.5	279.5	312.0	51.1	88.1	838.7	926.9	41.6	64.9	666.3	731.2	9.6	23.3	172.4	195.7
Heart Disease	19.1	64.7	104.6	169.3	27.0	186.0	318.9	504.8	17.7	110.1	181.7	291.8	9.4	75.9	137.1	213.0
Stroke	2.4	13.6	22.1	35.7	3.1	36.6	61.4	98.0	2.5	26.9	47.1	73.9	0.6	9.7	14.3	24.0
Mental Disorders	30.3	45.8	170.9	216.7	46.7	135.2	568.5	703.7	40.9	107.2	480.2	587.3	5.8	28.0	88.3	116.3
Total	162.2	277.0	1,046.7	1,323.7	230.7	790.0	3,362.6	4,152.6	190.5	572.4	2,457.6	3,030.0	40.2	217.6	905.0	1,122.6

Sources: Milken Institute, MEPS, NHIS

Endnotes

1. *Chronic Conditions: Making the Case for Ongoing Care*, ed. Johns Hopkins University Partnership for Solutions (Baltimore: September 2004 update).
2. Earl S. Ford et al., "Explaining the Decrease in U.S. Deaths from Coronary Disease, 1980–2000," *The New England Journal of Medicine* 356 (2007).
3. See Kenneth E. Thorpe, Curtis S. Florence, and Peter Joski, "Which Medical Conditions Account for the Rise in Health Care Spending? The Fifteen Most Costly Medical Conditions Accounted for Half of the Overall Growth in Health Care Spending between 1987 and 2000," *Health Affairs* (2004). See also Kenneth E. Thorpe et al., "The Impact of Obesity on Rising Medical Spending: Higher Spending for Obese Patients Is Mainly Attributable to Treatment for Diabetes and Hypertension," *Health Affairs* (2004).
4. Diabetes prevalence has nearly doubled, rising from a low of 3.91 per 100,000 people in 1990 to a rate of 7.72 per 100,000 people in 2003. This rate suggests a strong causal relationship with the risk factor of obesity. During the period from 1990 to 2003, the percentage of the U.S. population classified as obese—rather than simply overweight—rose from 12.81 percent to 22.81 percent. Based on Behavioral Risk Factor Surveillance System (BRFSS) self-reported rates, which under-report actual rates.
5. Edward W. Gregg et al., "Secular Trends in Cardiovascular Disease Risk Factors According to Body Mass Index in U.S. Adults," *Journal of the American Medical Association* 293, no. 15 (2005).
6. K. M. Venkat Narayan et al., "Lifetime Risk for Diabetes Mellitus in the United States," *Journal of the American Medical Association* 290, no. 14 (2003).
7. We use the category in the MEPS database called mental disorders. This category includes anxiety disorders, schizophrenia, senility, other psychoses, and substance-related disorders. It excludes Alzheimer's and other hereditary and degenerative neurological disorders.
8. McGinnis and Foege, "Actual Causes of Death in the United States."
9. Ford et al., "Explaining the Decrease in U.S. Deaths from Coronary Disease, 1980–2000." *Journal of the American Medical Association.*
10. In aggregate, the analysis includes the costs of secondary effects if they occur in one of the seven diseases studied. For example, if a patient with diabetes later develops heart disease as a consequence, those costs are captured in the heart disease costs and in our totals, but not shown as related to diabetes.
11. American Diabetes Association. "Economic Costs of Diabetes in the U.S. in 2002." *Diabetes Care*, March, 2003; 26(3): 917–932. Note that if comorbidity costs are removed, the ADA study produces a direct cost of $23.2 billion, the MEPS total for the same year.
12. Five diseases—breast, colon, lung, prostate, and "other" cancers—are not included in the MEPS summary tables, but we use MEPS data files for numbers of Population Reporting a Condition (PRC) by site of services to estimate expenditures and PRC for these diseases.
13. PRC is population reporting condition as used by Cohen and Krause at AHRQ and other researchers, but stems from the total number of people accounting for expenditures by site of service in MEPS.
14. Sean Nicholson et al., "Measuring the Effects of Work Loss on Productivity with Team Production," *Health Economics* 15, no. 2 (2006).
15. "The Hidden Competitive Edge: Employee Health and Productivity," (Newton, Massachusetts: Employers Health Coalition, 2000).
16. R Loeppke et al., "Health and Productivity as a Business Strategy," *Journal of Occupational and Environmental Medicine* 49, no. 7 (2007).

17. Calculations were also performed using a wage-based approach; when measured in wages, as opposed to GDP, the productivity loss totaled $464.0 billion for the year. Most analyses of the indirect impacts of chronic disease base their estimates on average wages. Wages are the most accurate measure for evaluating the value of lost work hours or productivity at the margin to an individual employee. But GDP per employee is more accurate for evaluating the marginal loss to the firm or to the economy overall.
18. National Cancer Institute, "Cancer Trends Progress Report," (2005).
19. Department of Health and Human Services, "Diseases and Conditions." See: http://www.hhs.gov/diseases/index.html (accessed September 13, 2007).
20. Changes in the price level, or inflation.
21. "Smoking 101 Fact Sheet," American Lung Association. See: http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=39853 (accessed May 3, 2007).
22. The cumulative difference in lost productivity, using a wage-based method rather than a GDP-based method, totals $3.0 trillion.
23. Roland Sturm et al., "Obesity and Disability: The Shape of Things to Come," in *RAND Research Highlights* (RAND Corporation, 2007). Available at http://www.rand.org/pubs/research_briefs/RB9043-1/.
24. New England Healthcare Institute, *The Boston Paradox: Lots of Health Care, Not Enough Health Indicators of Health, Health Care and Competitiveness in Greater Boston.* (Boston: 2007).
25. Gary Becker, "Human Capital and the Economy," *Proceedings of the American Philosophical Society;* 136, no. 1 (1992).
26. Bloom, David E., David Canning, and Sevilla, Jaypee. "The Effect of Health on Economic Growth: A Production Function Approach." *World Development*, 2004; 32(1): 1–13. The productivity boost is consistent with established results, but one must consider the limitations of applying the results to a market like the United States. See also Guillem López-Casasnovas, Berta Rivera, and Currais Luis, *Health and Economic Growth: Findings and Policy Implications.* (Cambridge: The MIT Press, 2005).
27. Some statistical projections use life expectancy at birth, but this is generally used to proxy a country's health and poverty, and seems less appropriate for a leading economy.
28. We see from separate state cross-sectional regressions that a 1.0 percent increase in life expectancy at age 65 is associated with a 1.8 percent increase in the percent of the adult population with a bachelor's degree or above.
29. Kevin Murphy and Robert Topel, "Diminishing Returns? The Costs and Benefits of Improving Health," *Perspectives in Biology and Medicine* 46, no. 3, Summer Supplement (2003).

OVERVIEW AND INTRODUCTION

Over the past half century, the United States has made substantial progress in reducing mortality rates from chronic disease. The death rate from heart disease, for example, has dropped by nearly two-thirds. Yet heart disease is still the nation's leading cause of death. And the rates at which people develop the disease—which includes a number of conditions, such as angina, arrhythmia, heart failure, and heart attack—have not dropped at all.

In fact, heart disease and other chronic diseases are on the rise, despite improvements in screening and treatment, and changes in unhealthy behaviors. Approximately 5 million Americans will be diagnosed with cancer, heart disease, stroke, or diabetes in 2007. And 1.5 million will die from these conditions or related complications. They face a diminished quality of life, and the emotional and financial toll on their families will be enormous.

But less acknowledged is the toll on others: employers, government, and the economy as a whole. In 2003 alone, Americans paid $277.0 billion to treat a handful of chronic diseases, a figure that doesn't include treatment costs for patients in nursing homes and other institutionalized settings. The nation's businesses lost $1.1 trillion in missed workdays and lower productivity related to health problems.

This study examines eleven chronic disease categories—five cancers, diabetes, several cardiovascular diseases, pulmonary conditions, and mental disorders—and measures the economic benefits that could result from effective prevention and treatment strategies. Each disease is associated with high treatment costs. Each has been linked to behavioral and/or environmental risk factors. Many share risk factors that broad-based prevention programs could address.

We consider each of the diseases in terms of five economic areas:

- **Historical direct costs:** treatment expenditures
- **Avoidable direct costs:** the projected difference, between baseline and optimistic scenarios, in treatment expenditures through 2023
- **Historical indirect impacts:** the forgone (avoidable) economic growth—lost workdays and lower employee productivity—associated with chronic disease
- **Avoidable indirect impacts:** the projected difference, between baseline and optimistic scenarios, in forgone economic growth through 2023
- **Intergenerational impacts:** a long-term analysis of the effects of health and education on economic growth.

This study also offers a bitter pill: what we stand to lose in economic growth and higher treatment costs—more than a trillion dollars within two decades—if we fail to address the impacts of chronic disease through national initiatives that target all age groups and reach beyond short-lived wellness trends.

I: The Historical Direct Costs Of Chronic Disease

This study uses expenditure information from the Medical Expenditure Panel Survey (MEPS) to estimate the historical direct costs, or treatment expenditures, of the disease categories under review. The MEPS surveys, launched in 1996 by the federal Agency for Healthcare Research and Quality (AHRQ), collect national (census-based) data on specific services, the frequency of service, and expenditure information for chronic disease. The surveys do not cover institutionalized populations, i.e., those in nursing homes, prisons, the military, or under other supervised care. Nonetheless, MEPS is the only data source for annual medical expenditures by disease and site of service. And because the data are comparable to those from earlier medical expenditure surveys, it is possible to analyze historical trends in treatment costs. We use MEPS data from 1996 through 2003.

MEPS survey data comprise two major components: a Household Component (or HC, derived from responding individuals and families) and an Insurance (employer-derived) Component. We do not include two additional components: a supplemental medical provider component and a nursing home component, available only for 1996.

The Household Component is particularly relevant because each year it resurveys a sub-sample of participants from the previous year's National Health Information Survey (NHIS). The component includes demographic characteristics, medical conditions, health status, and the use of medical services (known as "individual events") by site of service for more than 30,000 people each year. These statistics can be used to project estimates for the civilian—non-institutionalized population by adjusting various factors to reflect nationally representative totals.

MEPS also provides summary tables of Population Reporting a Condition (PRC) totals and treatment expenditures for sixty chronic conditions. Six of the disease categories examined here—heart conditions; pulmonary conditions; hypertension; diabetes; stroke, and mental disorders—are covered by those tables. But the remaining five, all cancers, are not. To obtain PRC equivalents and treatment expenditures for these—breast, colon, lung, prostate, and "other" cancers—we use the "individual events" totals by site of service. Sites of service include hospitals stays, emergency room visits, pharmacies, and outpatient clinics; we exclude home health-care costs.[1]

For the five cancer types, we adjust the PRC-equivalent figures and treatment expenditures across the four census-based MEPS regions. This involves accounting for outliers (values that differ significantly from the majority), which we do by looking at a share of a specific cancer PRC relative to the total PRC figures and expenditure for all cancer types in that region. If the share difference is larger than 10 percent for expenditures and 5 percent for PRC, then the data point is adjusted, but not excluded. The process allows us to adjust the regional totals back to the MEPS national total.

In order to obtain representative historical trends for the five cancers, it is necessary to account for time-series outliers as well. Thus, we compare each year's share of expenditures and PRC totals for a specific cancer to overall cancer types with the eight-year (1996–2003) average, adjust the data points, and scale to match the MEPS U.S. total.

As a last step, a three-year moving average is applied to all the disease categories. Once we have sums that are both historically representative and disease-specific, we can allocate both data sets, treatment costs and PRC, to the fifty states. A complete methodology is available online at *www.chronicdiseaseimpact*.com.

1. Home health-care costs are not included because this data file does not provide specific disease information. Instead, we use the medical condition data file to identify specific disease categories within the file for disease-specific home health-care costs.

A. Disease Trends and Direct Costs: National Level

Numerous factors have shaped health trends over the past two decades. On the positive side, improvements in diagnosis and treatments have helped flatten and, in some cases, roll back disease rates. The benefits of lifestyle changes, such as smoking cessation and improved diet, are also showing up in disease trends. Countering these factors, the aging baby boom population is pushing up health-care costs and straining the health-care system. Meanwhile, as more Americans move to cities, health problems associated with urbanization are on the rise.

Many of the trends in the data have actually been discernable even beyond the scope observed in the MEPS data. According to the National Center for Health Statistics, for example, the prevalence[2] rate of cardiovascular disease rose from 64.7 per 1,000 people in 1970 to 99.3 per 1,000 people in 1990, a 53.4 percent increase. During the same period, overall cancer incidence rates rose from 11.1 per 1,000 people to 18.7 per 1,000, an increase of 68.5 percent.[3]

Key Differences in Direct Costs from Other Studies

	Direct Costs (US$ Billions)		
Chronic Disease	**Milken Study**	**Other Studies**	**Source of Other Studies**
Cancer	48.1	74.0	American Cancer Society
COPD, Asthma	45.2	31.5	American Lung Association
Diabetes	27.1	92.0	American Diabetes Association
Heart Disease, Stroke	78.3	242.0	Centers for Disease Control and Prevention
Hypertension	32.5	–	Centers for Disease Control and Prevention
Mental Disorders	45.8	92.0	National Mental Health Association/CDC

Because this study is addressing a larger economic context, the summary of historical direct costs (treatment costs) excludes the costs of comorbidities and secondary effects. Nowhere is this more apparent than with diabetes. The American Diabetes Association included the cost of all comorbidities when it determined that $91.8 billion in direct costs for 2002 were attributable to the disease.[4]

If comorbidity costs are removed, the costs are the same as the MEPS total for the year.

With the exception of blindness and amputation, most significant diabetes comorbidities are examined as part of the overall cost of our study. However, since the secondary effects of diabetes are often diseases unto themselves or are related to other factors (cancers, hypertension, and obesity), these treatment costs are excluded from diabetes-specific costs.

It is important to note when comparing estimates of direct costs that this study uses the direct costs to establish benchmarks for projecting future increases in both direct and indirect impacts. In order to establish benchmarks, we must create a uniform methodology that eliminates the possibility of cost overlap or replication. This approach is not intended to underestimate or understate the impacts of the individual diseases. But it is necessary in order to examine the economic costs of each disease in terms of historic context and projections.

2. Prevalence is used to define the number of individuals with a disease, while incidence refers to the numbers of new cases reported in a given year.
3. David M. Cutler et al. "Measuring the Health of the U.S. Population." *Brookings Papers on Economic Activity*, 1997: 218.
4. American Diabetes Association. "Economic Costs of Diabetes in the U.S. in 2002." *Diabetes Care*, March, 2003;26(3): 917-932

Direct Costs by Disease, 2003

Disease	Expenditures (Billions)	PRC* (Millions)	Expenditures/PRC (Thousands)
Cancer	48.1	10.6	4.5
Breast Cancer	5.5	1.1	4.8
Colon Cancer	3.9	0.3	11.5
Lung Cancer	6.3	0.4	17.1
Prostate Cancer	4.3	1.0	4.1
Other Cancers	28.0	7.7	3.6
Pulmonary Conditions	45.2	49.2	0.9
Diabetes	27.1	13.7	2.0
Hypertension	32.5	36.8	0.9
Heart Disease	64.7	19.2	3.4
Stroke	13.6	2.4	5.6
Mental Disorders	45.8	30.3	1.5
Total	277.0	162.2	1.7

*PRC: Population Reporting Condition
Sources: MEPS, Milken Institute

BREAST CANCER

Breast cancer has been on the decline in the United States over the past decade due to changing demographics, improved screening, and advances in treatment. The clearest definable cause for the decrease is demographic: during much of the 1990s, the share of the population over age 65 actually shrank (due chiefly to lower birth dates during the Depression years). As shown in the following table, the breast cancer rate increased by nearly 40 percent from 1979 to 1998. From 1998 to 2002, the rate declined from 140.8 per 100,000 to 133.8. As the baby boomer generation moves into retirement age, this trend should reverse itself amid a surge of breast cancer cases based entirely on demographics in the absence of countervailing behavioral factors.

Behavioral factors, such as exercise, can explain the regional variations in breast cancer rates. Increased physical activity clearly reduces risk of the disease. Other factors, such as occupation, also affect rates of the disease. In fact, women who work in jobs requiring high levels of physical labor are 18 percent less likely to develop the disease[5]. Poor diet and inadequate levels of exercise lead to increased risk of obesity and a higher probability of breast cancer. Some research suggests that alcohol consumption also has an effect on incidence rates, although a definitive link has not been established. Women who consumed between two and five drinks a day in a long-term study in North America and Europe were found to have a 41 percent greater risk of developing breast cancer than were non-drinkers.[6]

Perhaps the most controversial factor is a suggested link to hormone replacement therapy (HRT). While there is disagreement about the complex set of risks and benefits associated with HRT, much attention has been paid to the fact that breast cancer rates dropped in 2003, after the federal government issued warnings about the dangers of HRT. A recent press release by the M.D. Anderson Cancer Center at the University of Texas reinforces this perception, noting specifically that the drop occurred after a nearly 50 percent reduction in the use of HRT in the 2002–2003 period.[7]

5. P.F. Coogan et al. "Physical Activity in Usual Occupation and Risk of Breast Cancer," 1997: 626–31.
6. S.A. Smith-Warner et al. "Alcohol and Breast Cancer in Women: A Pooled Analysis of Cohort Studies." *Journal of the American Medical Association*.
7. P. Ravdin and D. Berry. Press Release. "Decline in Breast Cancer Cases Likely Linked to Reduced Use of Hormone Replacement." M.D. Anderson Cancer Center at the University of Texas, December 14, 2006.

However, no clear causal link between HRT and breast cancer has been established, and other factors, such as changes in mammography screening, may also play a role.[8]

Total expenditures for breast cancer rose from $4.6 billion in 1998 to $5.5 billion in 2003. This increase is almost entirely explained by a jump in the number of PRC during the period, from 982,000 to 1,140,000. Expenditures per PRC remained generally constant, rising from $4,707 in 1998 to $4,840 in 2003.

Cancer Incidence Rate - For All Age Groups

Year	Breast	Colon	Lung	Prostate
1979	102.1	62.3	58.6	103.4
1980	102.1	63.7	60.7	105.9
1981	106.3	64.2	62.0	108.9
1982	106.4	62.8	63.3	108.2
1983	111.1	63.6	63.4	111.5
1984	115.8	64.8	65.5	111.6
1985	124.1	66.3	64.6	115.4
1986	126.7	64.2	65.8	119.0
1987	134.4	62.7	67.9	133.5
1988	131.3	61.4	68.0	137.5
1989	127.1	61.7	67.5	145.2
1990	131.7	60.6	68.0	170.7
1991	133.6	59.4	69.2	214.5
1992	131.8	58.0	69.4	237.0
1993	129.0	56.8	67.7	209.1
1994	130.8	55.6	67.2	179.8
1995	132.3	54.0	66.8	168.5
1996	133.3	54.7	66.4	168.4
1997	137.4	56.3	66.6	172.5
1998	140.8	56.6	67.5	169.6
1999	140.6	55.3	65.7	182.0
2000	135.7	53.9	63.9	180.9
2001	137.3	53.1	63.7	182.5
2002	133.8	52.5	63.4	179.1
2003	124.2	49.5	62.7	164.9

Sources: Surveillance Epidemiology and End Results, National Cancer Institute

Breast Cancer Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	982	4,707	4.6
1999	977	4,511	4.4
2000	997	4,170	4.2
2001	1,015	4,381	4.4
2002	1,112	4,874	5.4
2003	1,140	4,840	5.5

Sources: MEPS, Milken Institute

8. .S.L. Stewart et al. "Decline in Breast Cancer Incidence – United States, 1999-2003." Morbidity and Mortality Weekly Report, Center for Disease Control and Prevention, June 8. 2007; 549-553

COLON CANCER

The incidence rate for colon cancer peaked in 1985, at 66.3 per 100,000 population. With the exception of a minor increase from 1995 to 1998, the rate generally held steady or declined from the mid-1980s, reaching a low of 49.5 per 100,000 people in 2003. Again, lower birthrates during in the 1930s and 1940s played a role. Improved screening and detection, and a national trend toward promoting regular examinations proved to be significant factors in rate reduction. As with breast cancer, however, the demographic bulge of aging baby boomers is likely to bring the rates back up. The incidence rate of colon cancer is directly tied to age; for people ages 60–79, the rate is more than fifty times that for people 40 and younger.[9]

Colon cancer was second only to lung cancer in expenditures per PRC in 2003, averaging $11,549.

Smoking, alcohol consumption, and diet and exercise (and their associations with obesity) remain primary risk factors. A person whose body mass index (BMI)[10] totals 35.0–39.9 has a colon cancer risk 84 percent higher than does someone in a more moderate BMI range of 18.5–24.9.[11] (A BMI of 18.5–24.9 represents normal weight; a score of 25–29.9 designates an overweight condition; and a BMI of 30 or more indicates obesity.)

Colon cancer was second only to lung cancer in expenditures per PRC in 2003, with the average of $10,750 in 1998 rising to $11,549. The PRC total was actually lowest among the profiled diseases, with 306,000 cases in 1998 and 339,000 in 2003. Total expenditures for colon cancer amounted to $3.9 billion in 2003.

Colon Cancer Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	306	10,750	3.3
1999	301	10,976	3.3
2000	307	10,183	3.1
2001	309	10,537	3.3
2002	324	11,383	3.7
2003	339	11,549	3.9

Sources: MEPS, Milken Institute

LUNG CANCER

Lung cancer has been consistently linked to smoking, but the overall effect of smoking on national data trends is actually fairly limited. The greatest impact on both smoking and lung cancer rates occurred in the late 1960s and early 1970s, when the surgeon general's warning labels began appearing on cigarette packaging and advertising, and when tobacco products were banned from television commercials.

Overall incidence rates peaked in 1992, at 69.4 per 100,000 population. By 2003, the incidence rate had declined to 62.7 per 100,000. The percentage of Americans smoking fell from 27.7 percent in 1985 to 22.7 percent in 2003, according

9. "Colorectal Cancer Facts & Figures Special Edition 2005," American Cancer Society, http://www.cancer.org/downloads/STT/CAFF2005CR4PWSecured.pdf. (Accessed May, 3, 2007).
10. BMI is computed as weight in kilograms divided by height in meters squared.
11. E.E. Calle et al. "Overweight, Obesity and Mortality from Cancer in a Prospectively Studied Cohort of U.S. Adults." *New England Journal of Medicine*, April 24, 2003: 1625–38.

to survey data from the Behavioral Risk Factors Surveillance System. The effects of higher cigarette taxes and efforts to limit secondhand smoke in public places are only just beginning to show up in the data.

According to data from the National Center for Health Statistics, a male chain smoker (twenty-five or more cigarettes a day) age 35 and older has a three times greater chance of dying before age 65 than a former smoker of the same age (6.3 percent versus 1.9 percent). Even among younger men, ages 35–44, the estimated death rate is 3.2 per 100,000 for former smokers, compared to 9.3 for moderate smokers (twenty-five cigarettes or less) and 24.8 per 100,000 who smoke twenty-five or more cigarettes a day. By ages 65–74, the death rate of male former smokers rises to 383.3 per 100,000, and the death rate of current chain smokers rises to 1,365.2 per 100,000.[12]

Environmental factors, such as pollution levels and exposure to toxins, also play a clear role in incidence rates. For urban residents, the presence of radon in the home poses a risk of lung cancer. According to the Environmental Protection Agency, a non-smoker exposed to only 0.4 picoCurie of radon per liter of air (pCi/L) has a 73 in 10,000 risk of lung cancer death. If the rate rises to a significant 10 pCi/L, the lifetime risk of lung cancer death rises to 180 out of 10,000.[13]

Although the 2003 lung cancer PRC total was relatively low, at 370,000, its economic impact was significant. Expenditures per PRC totaled $17,088 in 2003, leading to a total expenditure of $6.3 billion. This high figure is attributable to treatment complications. It is the largest cost among the profiled cancers.

Lung Cancer Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	298	16,928	5.1
1999	311	15,497	4.8
2000	325	14,525	4.7
2001	346	15,180	5.2
2002	351	16,918	5.9
2003	370	17,088	6.3

Sources: MEPS, Milken Institute

PROSTATE CANCER

Prostate cancer incidence rates exhibit a direct correlation to age. Although clear advances have been made in treatment, the rate trends are mainly attributable to wider screening. Prostate cancer rates began to rise dramatically in the 1980s with the introduction of the prostate-specific antigen (PSA) exam. From 1986 to 1992, the incidence rate nearly doubled, from 119 per 100,000 population to 237 per 100,000 people. The rates declined sharply through 1998. As preventative screenings continued and cases were treated, the numbers normalized.

Diet doesn't appear to be as closely linked to prostate cancer as it is to colon cancer. Still, men with a BMI of 35.0–39.9 show a 34 percent higher incidence rate than do men with a BMI of 18.5–24.9.[14] Geography also plays a role in prostate

12. Mattson et al. "What Are the Odds that Smoking Will Kill You?" *American Journal of Public Health*, 1987, Vol. 77, Issue 4: 425–431.
13. http://www.epa.gov/radon/risk_assessment.html. (Accessed January 19, 2007).
14. D. Albanes et al. "Physical Activity and the Risk of Cancer in the National Health and Nutrition Examination Survey and Followup." *American Journal of Public Health*, 1989;79: 744–750.

cancer incidence. Regional diets and standards of medical care have clear impacts on disease rates that will be examined in a later discussion of state levels. With greater access to regular exams, urban areas show higher incidence rates and lower overall mortality rates. In fact, disparities in medical care appear to be responsible for between 10 percent and 30 percent of the regional variations in prostate cancer rates.[15]

Prostate cancer shows the lowest expenditures per PRC of the four isolated cancers in this study, rising from $3,793 in 1998 to $4,100 in 2003. Total expenditures during this period actually surpassed those of colon cancer, reaching $4.3 billion in 2003. This is largely due to a steep increase in the numbers of PRC, up from 771,000 in 1998 to 1,043,000 in 2003.

Prostate Cancer Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	771	3,793	2.9
1999	764	3,642	2.8
2000	779	3,370	2.6
2001	849	3,486	3.0
2002	947	3,787	3.6
2003	1,043	4,100	4.3

Sources: MEPS, Milken Institute

OTHER CANCERS

Skin cancer is by far the most common cancer, with more than one million cases diagnosed each year.[16] Improved warnings have led to the overall decline in incidence rates, although deaths from melanomas, the deadliest form of skin cancer, are on the rise. (Skin cancer is not profiled because of the relatively low cost of treatment, and low mortality and morbidity rates.)

Cancers of the liver, kidney, brain, bladder, and uterus, as well as leukemia, are also significant. Most of these, particularly liver and kidney cancers, are directly affected by such risk factors as alcohol abuse and poor diet. In this category, liver cancer and brain cancer have the highest mortality rates. However, because of low incidence rates, they do not constitute a significant share of other cancers.

Other Cancers Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	6,383	3,678	23.5
1999	6,193	3,617	22.4
2000	6,536	3,305	21.6
2001	6,819	3,664	25.0
2002	7,243	3,743	27.1
2003	7,689	3,644	28.0

Sources: MEPS, Milken Institute

15. A. Jemal et al. "Geographic Patterns of Prostate Cancer Mortality and Variations in Access to Medical Care in the United States." *Cancer Epidemiology, Biomarkers and Prevention*. American Association for Cancer Research, 2005;14(3): 582–5.
16. National Cancer Institute. See: http://www.cancer.gov/cancertopics/types/skin. (Accessed February 2, 2007).

PULMONARY CONDITIONS

Of the profiled diseases, asthma displays the highest geographic relationship to prevalence rates. Smoking plays a clear role in asthma risk, but the overall linkage between the two is relatively minor compared to the impacts of urban pollution, particularly on children. Smoking and lung cancer incidence rates have declined, but the rates of pulmonary conditions like asthma continue to rise. As noted in the following chart, rates of pulmonary disease have increased from 14.65 per 100,000 population in 1984 to 18.19 in 2003.

One significant factor in the increase appears to be motor vehicle pollution. As vehicle ownership rates rise, so does the rate of childhood asthma. According to a study at the Keck School of Medicine at the University of Southern California, a child's risk of asthma rises 82 percent for every 1.2 kilometers he lives nearer a freeway.[17]

According to a USC study, a child's risk of asthma rises 82 percent for every 1.2 kilometers he lives nearer a freeway.

Geography is also tied into a strong racial variation in asthma rates, according to the American Lung Association. The much higher concentration of African Americans in urban settings contributes to a prevalence rate more than 37 percent higher than that for Caucasians. The age-adjusted death rate for asthma among African Americans is three times that of Caucasians.[18]

Expenditures per PRC in 2003 were the lowest among the profiled diseases. Total expenditures, however, amounted to $45.2 billion, placing it among the most expensive diseases profiled. Pulmonary conditions also saw a clear spike in terms of PRC numbers, rising from 40,853,000 in 1998 to 49,206,000 in 2003. At the same time, expenditures per PRC rose from $728 to $919.

Pulmonary Conditions Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	40,853	728	29.8
1999	41,652	755	31.4
2000	42,278	803	33.9
2001	45,030	848	38.2
2002	47,562	884	42.1
2003	49,206	919	45.2

Sources: MEPS, Milken Institute

17. Rob McConnell et al. "Traffic, Susceptibility, and Childhood Asthma." *Environmental Health Perspectives*, 2006 May; 114(5): 766–772.
18. http://www.lungusa/org/site/pp.asp?c=dvLUK9O0E&b=312474.

Prevalence Rates

Year	Diabetes	Hypertension	Stroke	Heart Disease	Pulmonary Conditions
1984	4.2	19.9	2.0	15.1	14.7
1985	4.2	19.9	1.9	14.6	14.6
1986	4.3	19.2	1.9	14.2	14.0
1987	4.3	18.5	1.8	14.4	15.2
1988	4.0	18.8	1.6	14.8	15.0
1989	4.1	17.7	1.7	13.4	15.7
1990	3.9	17.0	1.8	13.8	15.3
1991	4.5	17.2	1.8	14.5	15.3
1992	4.5	17.0	2.0	14.5	16.6
1993	4.6	16.6	2.0	14.5	16.0
1994	4.7	17.0	1.8	14.9	17.7
1995	5.1	17.9	2.0	14.2	17.5
1996	5.5	19.7	2.2	13.4	17.3
1997	5.9	21.6	2.5	12.9	16.7
1998	6.1	21.7	2.5	12.4	16.1
1999	6.4	22.0	2.5	12.1	16.3
2000	6.9	22.9	2.6	12.5	18.3
2001	7.3	23.8	2.8	12.6	19.0
2002	7.4	24.2	2.8	12.4	18.0
2003	7.7	24.8	2.9	12.6	18.2

Source: Trends In Health and Aging, National Center for Health Statistics (CDC)

DIABETES

U.S. dietary health and physical fitness levels have declined over the past fifteen years. In the same period, diabetes prevalence has nearly doubled, from a low of 3.91 per 100,000 in 1990 to 7.72 in 2003. This rate suggests a strong relationship with obesity. During the period, the percentage of the population classified as obese—rather than simply overweight—rose from 12.81 percent to 22.81 percent.[19]

A key source for tracking links between diabetes and obesity is the data examining type 2 diabetes in men and women by body mass index. The prevalence in both men and women with a BMI of 18.5–24.9 is only slightly above 2 percent (2.03 percent and 2.38 percent, respectively), but the prevalence rises rapidly with higher BMIs. For men with a BMI of 25–29.9, the prevalence more than doubles, to 4.93 percent, and then doubles again, to 10.10 percent, in men of a BMI of 30–34.9. For women with a BMI of 25–29.9, the ratio is even higher, at 7.12 percent. Although a negligible rise occurs in women with BMI of 30–34.9, at 7.24 percent, the ratio for women with a BMI greater than 40 rises to 19.89 percent.[20] According to these statistics, nearly one in five women with BMI greater than 40 has type 2 diabetes, compared to only one in forty women in the nominal BMI range.

19. Based on Behavioral Risk Factor Surveillance System (BRFSS) self-reported rates, which under-report actual rates.
20. National Diabetes Information Clearinghouse. See http://diabetes.niddk.nih.gov/dm/pubs/statistics. (Accessed January 19, 2007).

Improved diagnosis and understanding of symptoms have strengthened the obesity link. In 1960, the prevalence of diagnosed diabetes among those classified as overweight was 1.6 percent, and among the obese, 2.9 percent. By 2000, these rates had more than doubled for both groups, with a prevalence of 4.2 percent among the overweight and 10.0 percent among the obese.[21] Overweight and obese individuals have also been more effectively diagnosed with heart disease and related diabetes comorbidities.

Diabetes has a clear genetic component that can increase risk even more. African Americans are particularly at risk, with a 60 percent greater incidence than that of Caucasians. Twenty-five percent of all African-American women over age 55 have diabetes, and 25 percent of all African Americans between 65 and 75 have the disease.[22]

The PRC totals rose more than 37 percent from 1998 to 2003, from 9,981,000 to 13,729,000. Total expenditures rose nearly 60 percent for the period, from $17.0 billion to $27.1 billion. Expenditures per PRC accounted for only a small portion of the increase, rising from $1,701 per patient to $1,977.

Diabetes Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	9,981	1,701	17.0
1999	10,784	1,697	18.3
2000	11,423	1,562	17.8
2001	12,104	1,712	20.7
2002	12,902	1,845	23.8
2003	13,729	1,977	27.1

Sources: MEPS, Milken Institute

HYPERTENSION

Like diabetes, hypertension (high blood pressure) presents a number of debilitating symptoms on its own. But it also serves as an enabler for comorbidities that are often more destructive than the disease itself. Chronic hypertension is the primary risk factor for stroke and a principal contributor to heart attacks.[23]

Significant risk factors include age, high alcohol consumption, obesity, and race. Among women, low alcohol consumption—less than one drink per day—appears to reduce rates of hypertension below the national average. However, 1.51 to 2.00 drinks per day show a 20 percent risk increase, and two drinks or more per day raise risk by 31 percent.[24] Key factors also include being male, African American, and overweight.[25]

21. E. Gregg et al. "Secular Trends In Cardiovascular Disease Risk Factors According to Body Mass Index in U.S. Adults." *Journal of the American Medical Association*. 2005;293(15):1868–1874.
22. Statistics from www.blackhealthcare.com. (Accessed January 31, 2007).
23. Centers for Disease Control and Prevention. See: www.cdc.gov/bloodpressure. (Accessed January 30, 2007).
24. R. Thadhani et al. "Prospective Study of Moderate Alcohol Consumption and Risk of Hypertension in Young Women." *Archives of Internal Medicine*, 2002;162(5): 569–574.
25. I. Hajjar et al. "Trends in Prevalence, Awareness, Treatment and Control of Hypertension in the United States, 1988-2000." *Journal of the American Medical Association*. 1999;281(14):1291–1297.

Hypertension PRC totals rose by about a third, from 27,264,000 in 1998 to 36,761,000 in 2003. Expenditures per PRC, while the lowest among the diseases profiled, still saw a rise from $670 per PRC to $885 for the period. The low expenditures per PRC could be attributable to low levels of hospitalizations and intensive medical care. However, the tendency of hypertension to increase the risks of other, more expensive conditions (such as stroke) results in significantly higher *potential* treatment costs than can be measured just for the disease itself.

Hypertension Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	27,264	670	18.3
1999	28,615	728	20.8
2000	30,039	750	22.5
2001	31,881	802	25.6
2002	34,253	821	28.1
2003	36,761	885	32.5

Sources: MEPS, Milken Institute

HEART DISEASE

Heart disease is the leading cause of death in the United States. The term itself refers to a wide range of diseases and conditions, including angina, arrhythmia, heart failure, and heart attack. In 2002, 696,947 people died from heart disease, and in 2004, 24.7 million adults suffered from the disease.[26]

From 1984 to 1999, prevalence fell from 15.05 per 100,000 population to 12.10 per 100,000. This decline was largely due to increased prevention awareness and treatment, as well as new drug classes, including anti-clotting medications, beta-blockers, and angiotension-converting enzyme inhibitors. Since 1999, however, heart disease has been on the rise: up to 12.59 per 100,000 population. The increase is not yet significant, but the links to increased obesity and reduced exercise suggest that rates will climb further. The aging population will also add prevalence numbers. And secondary effects of other diseases (cancer, hypertension, and diabetes, for example) can weaken or damage the heart, and contribute to the upward trend.

Total expenditures here were higher than for any other profiled disease—in fact, more than for all forms of cancer combined. The increase over the period was almost entirely due to an upsurge in the number of cases. Expenditures per PRC increased very slightly, from $3,260 in 1998 to $3,381 in 2003. Total costs rose from $55.1 billion in 1998 to $64.7 billion in 2003, while PRC totals rose from 16,903,000 to 19,145,000.

Heart Disease Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	16,903	3,260	55.1
1999	17,082	3,233	55.2
2000	17,175	3,200	55.0
2001	17,400	3,331	58.0
2002	18,236	3,346	61.0
2003	19,145	3,381	64.7

Sources: MEPS, Milken Institute

26. http://www.cdc.gov/heartdisease/facts.htm. (Accessed January 29, 2007).

STROKE

A stroke is a cardiovascular injury that causes damage directly to the brain by reducing or blocking blood flow. Symptoms and potential costs differ from those associated with other cardiovascular conditions, such as heart disease, but the risk factors overlap considerably. Men are more likely than women to suffer from stroke, and African Americans have twice the risk of Caucasians. The greatest risk factor is hypertension, which increases the chance of stroke by four to six times. Other risk factors include age, gender, race, and family history. Of these, age is by far the most significant, with nearly 75 percent of strokes occurring in people 65 and older, after which the risk of stroke doubles every ten years.[27]

The strong causal linkage between hypertension and stroke is reflected in the previous prevalence table. Stroke rates declined from 1984 to 1988, with a spike in 1992 and 1993. Similarly, hypertension rates declined from 1984 to 1990, with a spike in 1991 and 1992. Each then dropped for two years before rising again. The stroke rate declined from 1.97 per 100,000 population in 1984 to a low of 1.62 per 100,000 in 1988. Stroke rates have since risen to 2.85 per 100,000 in 2003, despite reductions in smoking.

Unlike the other diseases profiled, total stroke expenditures remained stagnant in the 1998–2003 period, at around $13.6 billion. This decrease occurred despite an additional 247,000 PRC in 2003. Expenditures per PRC also decreased, from $6,269 to $5,596, which may be explained by limitations of the MEPS data, which exclude individuals in institutionalized care.

Stroke Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	2,178	6,269	13.7
1999	2,094	6,545	13.7
2000	2,136	6,199	13.2
2001	2,190	6,019	13.2
2002	2,360	5,550	13.1
2003	2,426	5,596	13.6

Sources: MEPS, Milken Institute

MENTAL DISORDERS

The causes of mental illness are complex. Heredity and environment both play a large role, and behavioral risk factors, such as drug and alcohol abuse and diet, can also be contributors. More than half the people with bipolar disorder have a relative who also suffers a form of depression.[28]

Socioeconomic factors play a significant role in both the likelihood of a depressive disorder onset and its severity. Other key factors include marital status and suffering from another chronic condition that includes depression as a comorbidity. In a survey of individuals approaching retirement age (54–65), those who lived alone were 62 percent more likely to suffer a major depressive episode. Divorced or widowed individuals were 117 percent more likely to experience such an episode. Individuals who suffered from potentially life-threatening cancer saw their risk increase by 49 percent; from hypertension, 71 percent; diabetes, 72 percent; stroke, 144 percent; heart disease, 166 percent; and lung disease, 192 percent.[29]

27. National Stroke Association. See: http://www.stroke.org/site/PageServer?pagename=CONT. (Accessed January 29, 2007).
28. National Institute of Mental Health. See: www.nimh.gov.
29. D. Dunlop et al. "Racial/Ethnic Differences in Rates of Depression Among Preretirement Adults." *American Journal of Public Health*. 2003;93(11):1945–1952.

One significant avoidable risk factor for major depressive episodes is routine alcohol or drug abuse. According to the Department of Health and Human Services, approximately one in every five adults (19.9 percent) who suffered such an episode was considered to be dependent upon drugs and/or alcohol, compared to only 8.4 percent of individuals who did not suffer depressive episodes. Virtually the same rate (19.8 percent) of 12- to 17-year-olds who suffered major depressive episodes were drug- or alcohol-dependent.[30]

Total expenditure figures for all mental disorders (various anxiety disorders, such as panic, obsessive-compulsive disorder, and phobias), including depression, rose by more than 50 percent, from $30.0 billion in 1998 to $45.8 billion in 2003. Expenditures per PRC remained largely flat through the period. PRC totals rose by nearly 50 percent, from 20,470,000 in 1998 to 30,338,000 in 2003, perhaps because the stigma of mental illness began to diminish.

Mental Disorders Population Reporting Condition (PRC) and Expenditure

Year	PRC (Thousands)	Expenditures per PRC (US$)	Total Expenditures (US$ Billions)
1998	20,470	1,465	30.0
1999	21,616	1,573	34.0
2000	22,860	1,557	35.6
2001	24,619	1,585	39.0
2002	27,518	1,505	41.4
2003	30,338	1,509	45.8

Sources: MEPS, Milken Institute

B. Disease Trends and Direct Costs: State Level

This preceding section addressed the methodology for obtaining representative historical treatment costs and PRC totals from MEPS national and census-based statistics, and for calculating historical treatment costs and PRC equivalents for the five cancers not included in the MEPS summary tables. In this section, we calculate representative treatment costs and PRC at the state level.

METHODOLOGY

As previously noted, MEPS provides regional disease-specific treatment costs by site of service—but not at the state level. Meanwhile, the Center for Medicare & Medicaid Services (CMS)[31] does publish personal treatment expenditures at the state level, but only by site of service—not by disease. This data is available from 1980 to 2004.

Due to the lack of disease-specific health-care costs at the state level, we use the CMS personal health-care expenditures by site of service and the MEPS regional expenditures.

MEPS data show great variations in expenditures. For example, in 2003, 53.5 percent of MEPS hypertension expenditures (again, derived from "site of service" expenditure tables) went to prescription medications, and just 15.5 percent to hospital care. In contrast, just 10.8 percent of heart disease expenditures went to prescription medications, while 64.2

30. U.S. Department of Health and Human Services. See: http://www.drugabusestatistics.samhsa.gov/ mh.cfm.
31. The Center for Medicare & Medicaid Services is part of the Office of the Actuary, National Health Statistics Group.

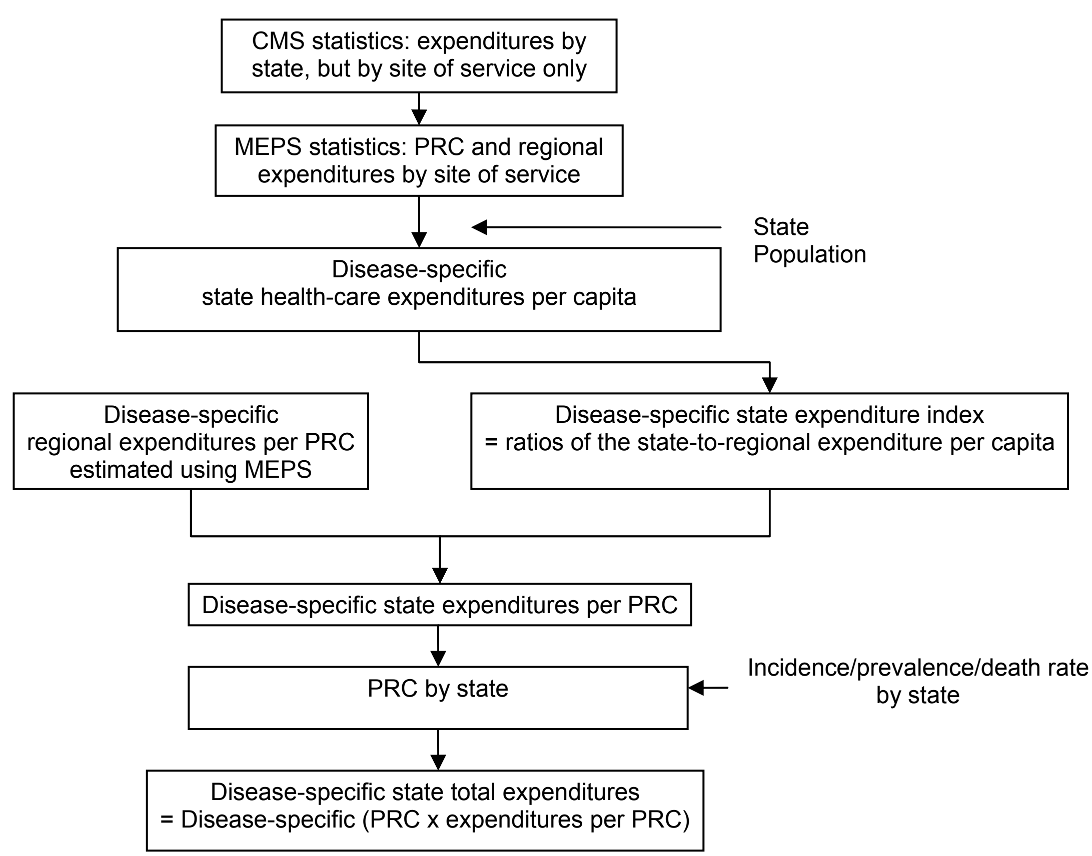
percent was spent on hospital care. These kinds of expenditures must be broken out from the regional totals and allocated by state.

To allocate treatment costs to the states, we apply MEPS expenditure shares (by site of service) to the state personal health-care costs from CMS. This produces a "weighted" per capita expenditure by state (weighted by site of service). We next index each state's weighted per capita expenditure against MEPS's regional per capita expenditures. Thus, we obtain state expenditures per PRC.

In order to calculate state PRC numbers, we use state-level statistics from several sources: (1) the National Cancer Institute of the CDC, which tracks disease incidence; (2) the CDC's Behavioral Risk Factor Surveillance System (BRFSS), which tracks disease prevalence; and (3) the National Center for Health Statistics (NCHS), which tracks death rates. (Incidence rates apply to breast, lung, colon and prostate cancer. Prevalence rates apply to diabetes, pulmonary conditions, and hypertension. For the remaining diseases—stroke, heart disease, and mental disorders—we use death rates due to a lack of incidence/prevalence data. These figures are benchmarked back to the regional totals to ensure accuracy.

Using disease-specific state shares of incidence/prevalence/death relative to the region, we break out PRC by state. Then we multiply the state PRC by the state expenditures per PRC to calculate each state's total expenditures by disease. The following flow chart illustrates this process.

Estimating Disease-Specific State Expenditure (PRC = Population Reporting Condition)

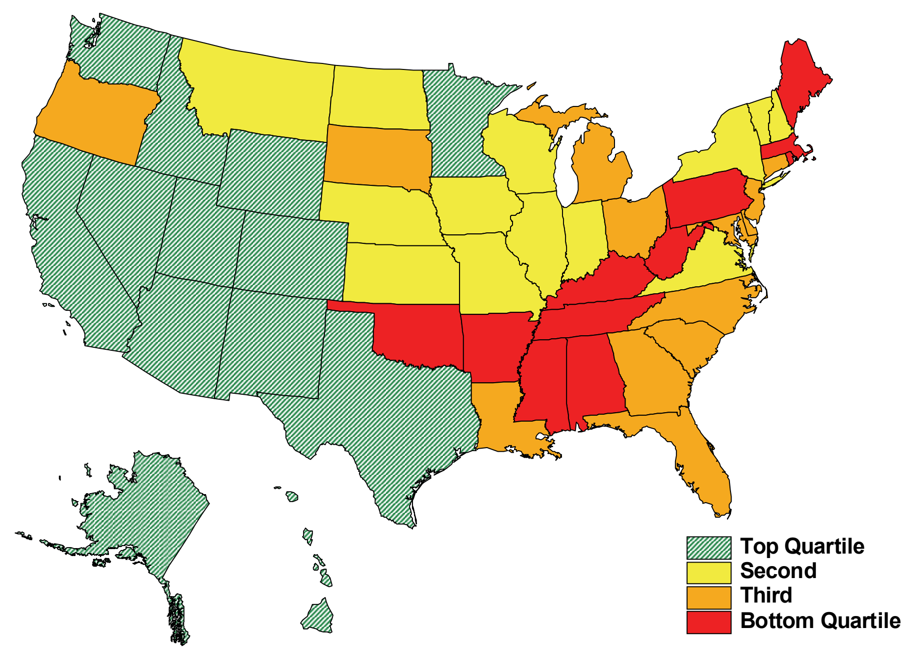


National patterns are mirrored by state-level data and can be used to demonstrate linkages between risk factors and disease incidence and/or prevalence. Smoking, alcohol abuse, poor diet, and low exercise rates show linkages to states with high rates of certain diseases. State demographics and urbanization also influence disease rates; urban pollution, for example, shows a statistically demonstrable impact on lung disorders. Ethnic composition plays a role, as do levels of record-keeping and reporting, and the rate at which people visit doctors.

Variations in disease expenditures across states depend not only on the prevalence of the disease but also on the available medical care. States with lower overall costs of living often have lower overall costs for basic medical care. They may also report a lower frequency of examinations that could reduce long-term treatment costs.

To assess the burden of chronic disease across all states, we create a State Chronic Disease Index. We estimate the PRC per capita and by disease, and then benchmark each state to the state with the lowest PRC per capita. That state is assigned a composite value of 100. Thus, a state with a value of 70 means its PRC per capita is 30 percent worse than the top state's. The following map and table display the results.

State Chronic Disease Index



Note: States in the top quartile have the lowest rates of seven common chronic diseases.

States that rank low in the index tend to have the worst readings on behavioral risk factors, the highest percentage of elderly residents, and a demographic mix predisposed to one or more chronic diseases. The least healthy states lie in a belt of obesity and smoking that runs from the Northeast through Oklahoma. West Virginia ranks as the least healthy state in the union. Tennessee (49th), Arkansas (48th), Kentucky (47th), and Mississippi (46th) also fare poorly. Western states score among the healthiest. Utah holds the distinction of being the nation's healthiest state, followed by Alaska, Colorado, New Mexico, and Arizona. The low scores for Massachusetts (40th) and Maine (43rd) result from the high incidence of cancers and, perhaps, better reporting rates.

State Chronic Disease Index, 2006

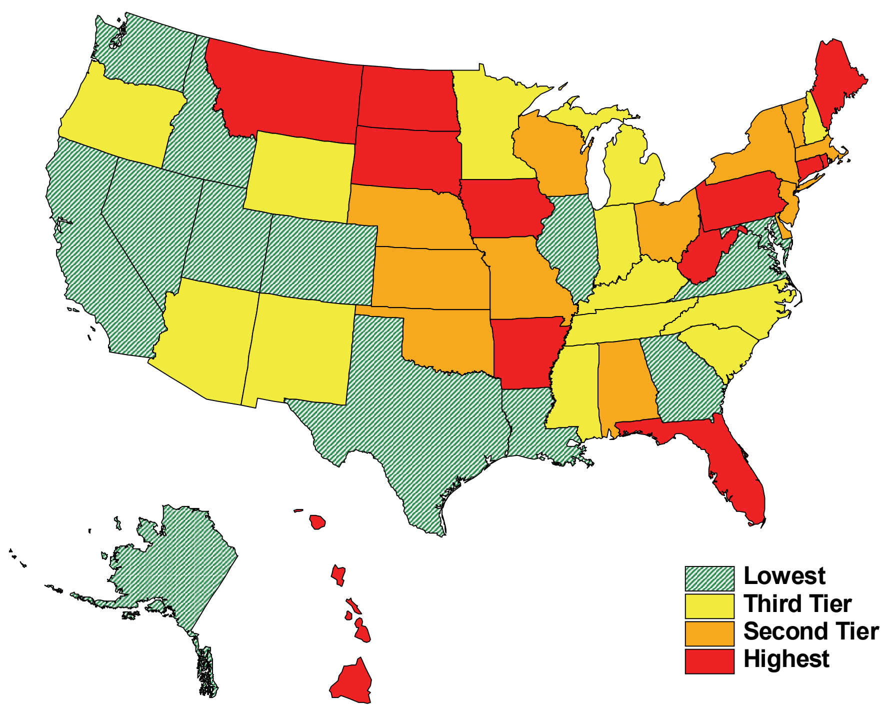
State	Rank	Composite Score	State	Rank	Composite Score
Utah	1	100.00	Vermont	26	75.62
Alaska	2	96.58	Maryland	27	75.05
Colorado	3	95.29	Michigan	28	74.82
New Mexico	4	93.50	Ohio	29	74.71
Arizona	5	91.50	Oregon	30	74.48
California	6	89.83	Georgia	31	74.12
Hawaii	7	88.38	New Jersey	32	74.10
Idaho	8	87.68	North Carolina	33	74.08
Washington	9	86.43	Connecticut	34	73.28
Wyoming	10	83.13	Delaware	35	73.18
Minnesota	11	82.59	South Dakota	36	72.20
Texas	12	82.26	Louisiana	37	70.55
Nevada	13	80.80	Florida	38	70.15
North Dakota	14	80.64	South Carolina	39	68.76
Illinois	15	80.04	Massachusetts	40	68.65
Kansas	16	79.87	Alabama	41	68.59
Nebraska	17	79.61	Oklahoma	42	67.76
New Hampshire	18	79.29	Maine	43	67.60
Montana	19	79.05	Rhode Island	44	66.76
Virginia	20	77.68	Pennsylvania	45	66.37
Wisconsin	21	77.29	Mississippi	46	66.17
New York	22	77.26	Kentucky	47	65.98
Indiana	23	77.14	Arkansas	48	65.68
Iowa	24	76.91	Tennessee	49	65.31
Missouri	25	76.12	West Virginia	50	62.19

Sources: Medical Expenditure Panel Survey, Behavioral Risk Factor Surveillance System (CDC), National Cancer Institute, Milken Institute

STATE-LEVEL RISK FACTORS

The most significant factor determining disease rates, particularly cancers, across states may be the number of people 65 and older. At retirement age, individuals often move and change lifestyles and dietary habits. The aging body doesn't fend off disease as easily as it once did. Cancers, heart disease, and stroke all show increased prevalence among seniors; even diabetes has a clear age component. As the overall median age of the population rises, this demographic trend will play a significant role across the country. And states like Florida, Arizona, and Arkansas that attract retirees will bear unusually high cost burdens.

Percentage of Population 65 and Older By State, 2003



States that show high levels in one or more of four significant and avoidable risk factors—smoking, alcohol consumption, poor diet, and low exercise rates—consistently demonstrate high incidence/prevalence rates and PRC levels for more than one disease. Kentucky and West Virginia, for example, rank among the top five states for multiple risk factors and can expect to see higher health-care costs and avoidable indirect impacts, such as lower worker productivity and missed workdays. States reporting high exercise rates—Minnesota (85.0 percent), Colorado (83.2 percent), and Utah (82.7 percent)—are likely to face lower treatment expenditures for many cancers, and heart and circulatory problems.

Percentage of Population Who Smoke, 2003

Top Five States	Percent	Bottom Five States	Percent
Kentucky	30.8	Utah	11.9
West Virginia	27.3	California	16.8
Missouri	27.2	Colorado	18.6
Louisiana	26.5	Connecticut	18.6
Alaska	26.2	Idaho	19.0

Source: Behavioral Risk Factor Surveillance System (CDC)

Percentage of Population Who Drink Alcohol Regularly, 2003

Top Five States	Percent	Bottom Five States	Percent
Rhode Island	8.2	Tennessee	2.2
Wisconsin	8.1	Utah	3.1
Vermont	7.8	North Carolina	3.2
Delaware	7.8	Kentucky	3.4
New Hampshire	7.2	West Virginia	3.7

Source: Behavioral Risk Factor Surveillance System (CDC)

Percentage of Population Who Are Obese, 2003

Top Five States	Percent	Bottom Five States	Percent
Alabama	28.4	Colorado	16.0
Mississippi	28.1	Hawaii	16.4
West Virginia	27.7	Massachusetts	16.8
Indiana	26.0	Rhode Island	18.4
Kentucky	25.6	Montana	18.8

Source: Behavioral Risk Factor Surveillance System (CDC)

Percentage of Population Who Have High Cholesterol, 2003

Top Five States	Percent	Bottom Five States	Percent
Michigan	38.2	Hawaii	27.0
West Virginia	38.1	New Mexico	27.2
Nevada	36.8	Alaska	27.6
Kentucky	35.5	Utah	27.8
Pennsylvania	35.2	Kansas	29.4

Source: Behavioral Risk Factor Surveillance System (CDC)

STATE COST VARIATIONS

One cannot just study disease prevalence data when considering the overall effect of health-care costs to the state. In many cases, a state showing high per capita treatment expenditures for a particular disease doesn't have particularly high prevalence of the disease. In Alaska, for example, health-care expenditures run 36 percent above the national average due to the state's isolation and transportation costs. Yet Alaska ranks low overall in terms of prevalence. In other cases, state subsidies flatten overall treatment costs, as is the case in Hawaii, where health care would otherwise run 7 percent above the national average. Massachusetts and Minnesota, both centers of specialized care and cutting-edge research, show higher overall costs. The lower costs in New Hampshire may relate to its proximity to Massachusetts, where residents can go for specialized treatments.

Mississippi and Oklahoma both show greater per capita health-care expenditures, caused by a higher prevalence of disease. But their overall costs are offset by a general lower cost of living.

State Health Expenditures - Percentage of National Average, 2003

Top Five States	Percent	Bottom Five States	Percent
Alaska	135.8	New Hampshire	84.9
Delaware	122.4	Utah	86.2
North Dakota	114.8	Idaho	87.0
Minnesota	112.7	New Mexico	87.8
Massachusetts	110.8	Arizona	89.3

Sources: Centers for Medicare & Medicaid Services (CMS), Milken Institute

STATE HEALTH TRENDS, BY DISEASE

BREAST CANCER

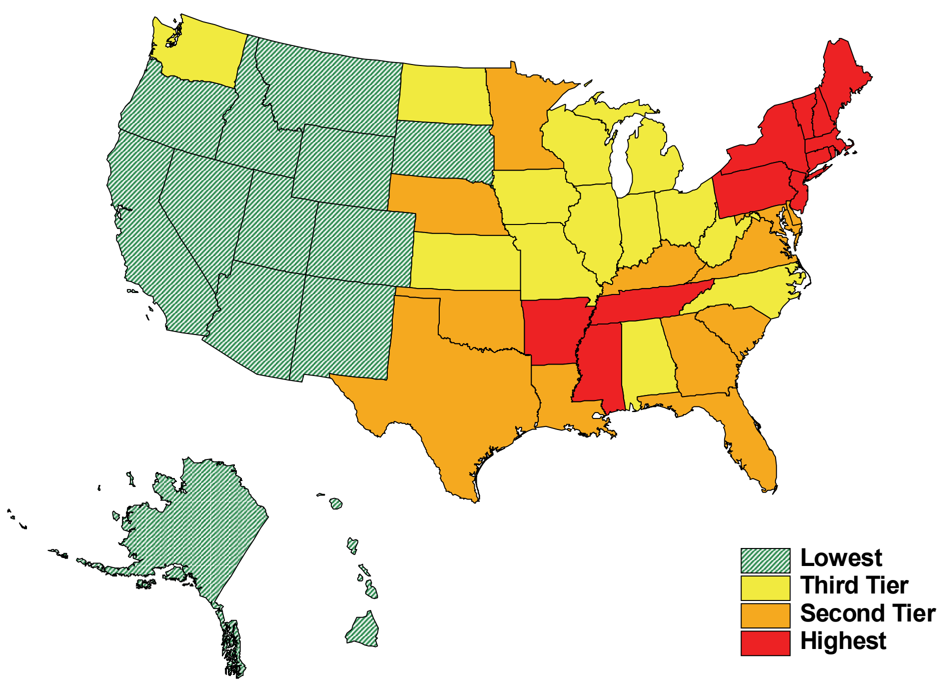
Northeastern states report the highest breast cancer incidence rates. Environmental and dietary factors, and a strong emphasis on exams and early diagnosis, play roles. Another factor may be the region's established history of women in the white-collar job market. Women in sedentary jobs show an increased risk of the cancer. Western states show the lowest incidence rates.

Breast Cancer Population Reporting Condition - As Percentage of Female Population, 2003

Top Five States	Percent	Bottom Five States	Percent
New Hampshire	1.00	Wyoming	0.55
Massachusetts	0.98	New Mexico	0.55
Connecticut	0.98	Arizona	0.57
Vermont	0.97	Montana	0.57
Rhode Island	0.95	Utah	0.57

Sources: MEPS, Milken Institute

Population Reporting Breast Cancer - Per Capita, 2003



COLON CANCER

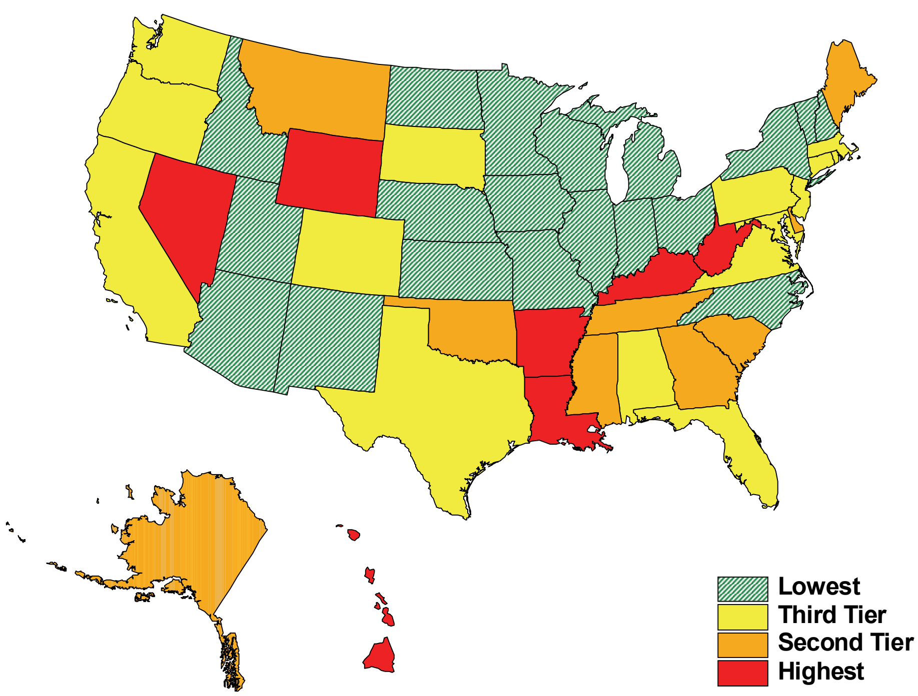
Of all cancers, colon cancer is the most clearly affected by diet. Smoking also appears to play a clear role. Not surprisingly, the five states scoring highest in disease incidence rank among the top fifteen states for smoking and overweight populations. On the other hand, Kansas—which ranks among the bottom five states—reports a large percentage of overweight population, but it scores among the ten lowest states for smoking and among the five lowest for cholesterol rates. Other states with the lower colon cancer rates display a similar pattern of low cholesterol and smoking rates. Hawaii is an exception; genetic predisposition and a larger population share over age 65 appear to override low smoking and cholesterol levels.

Colon Cancer Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
Wyoming	0.16	Kansas	0.09
West Virginia	0.15	Minnesota	0.09
Kentucky	0.15	Wisconsin	0.09
Louisiana	0.15	Michigan	0.09
Hawaii	0.14	Nebraska	0.10

Sources: MEPS, Milken Institute

Population Reporting Colon Cancer - Per Capita, 2003



LUNG CANCER

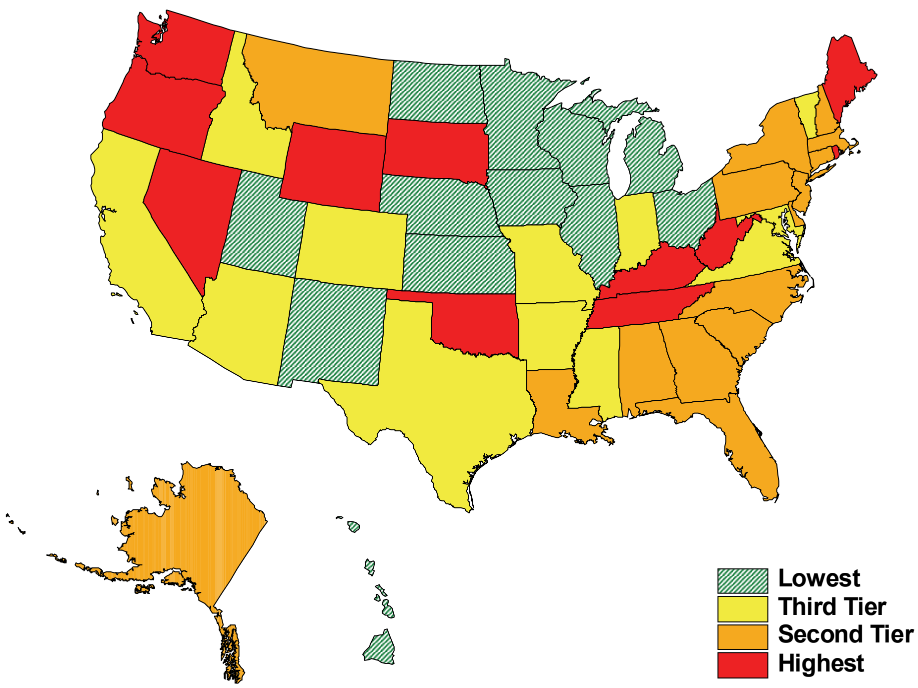
Kentucky and West Virginia, which report high smoking rates, also report high PRC totals for lung cancer. In fact, the five states ranking highest for lung cancer PRC also rank among the top ten for smoking rates. States scoring lowest for lung cancer report lowest rates of smoking.

Lung Cancer Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
Kentucky	0.18	Utah	0.06
Nevada	0.17	North Dakota	0.09
Tennessee	0.16	Minnesota	0.09
Wyoming	0.16	Nebraska	0.09
West Virginia	0.16	Kansas	0.10

Sources: MEPS, Milken Institute

Population Reporting Lung Cancer - Per Capita, 2003



PROSTATE CANCER

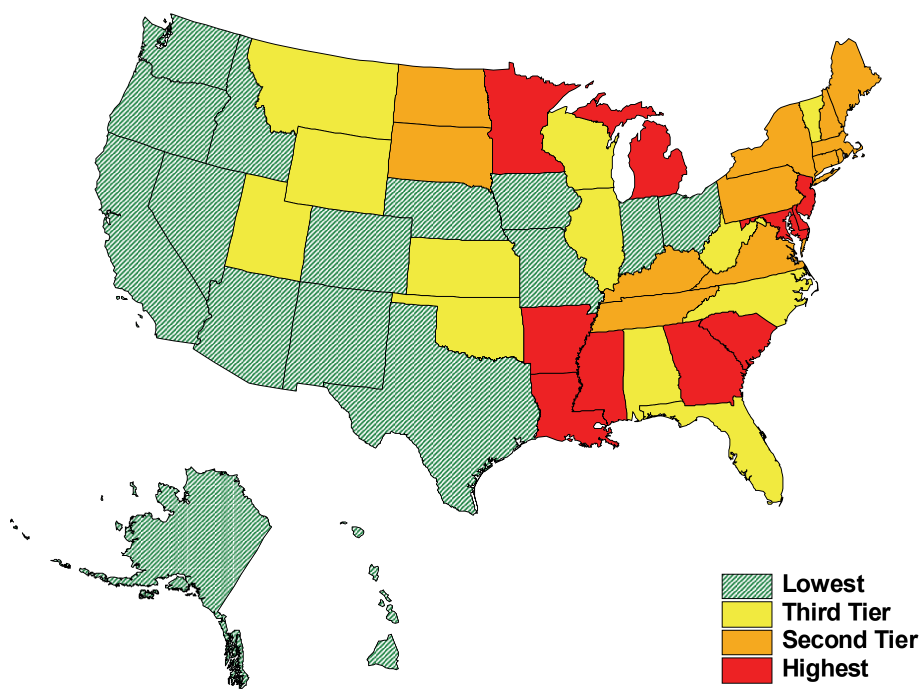
Prostate cancer risk is heavily influenced by dietary factors, such as high consumption of red meat, dairy products, and fatty acids. Genetic and racial factors increase the risk, with African-American males more likely to be diagnosed with the disease. States ranking low in prostate cancer PRC display high rates of exercise and low obesity rates.

Prostate Cancer Population Reporting Condition - As Percentage of Male Population, 2003

Top Five States	Percent	Bottom Five States	Percent
Mississippi	1.06	Arizona	0.41
Arkansas	1.03	Hawaii	0.43
New Jersey	0.99	Missouri	0.56
Louisiana	0.93	New Mexico	0.56
Maryland	0.91	Oregon	0.59

Sources: MEPS, Milken Institute

Population Reporting Prostate Cancer - Per Capita, 2003



OTHER CANCERS

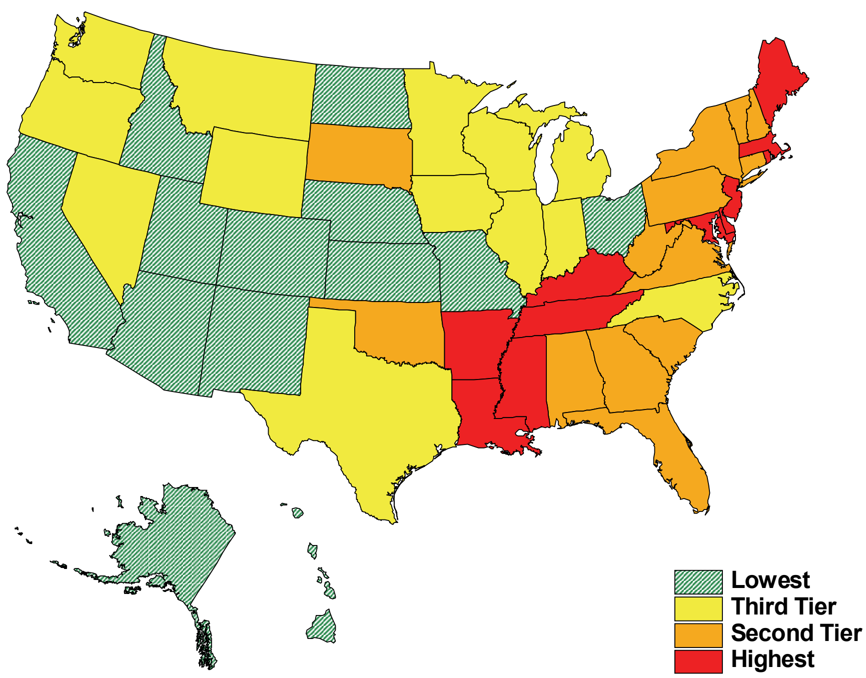
Factors that influence the preceding cancers—breast, colon, prostate, and lung cancer—remain significant in determining risks for "other cancers." States with the highest PRC totals of other cancers also report the highest levels of obesity, cholesterol, and smoking. The bottom five states report high exercise rates and low cholesterol levels.

Other Cancers Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
Arkansas	3.40	Arizona	2.17
Tennessee	3.31	Utah	2.17
Mississippi	3.19	New Mexico	2.21
Kentucky	3.11	Colorado	2.23
Maryland	3.04	Alaska	2.27

Sources: MEPS, Milken Institute

Population Reporting Other Cancers - Per Capita, 2003



PULMONARY CONDITIONS

Densely urbanized regions, such as New England (excluding Vermont) and the Northeast, pose higher risks. The most significant pollution factor remains motor vehicle emissions, but pollutants from industrial factories, coal-fired power plants, and coal mining cannot be discounted.

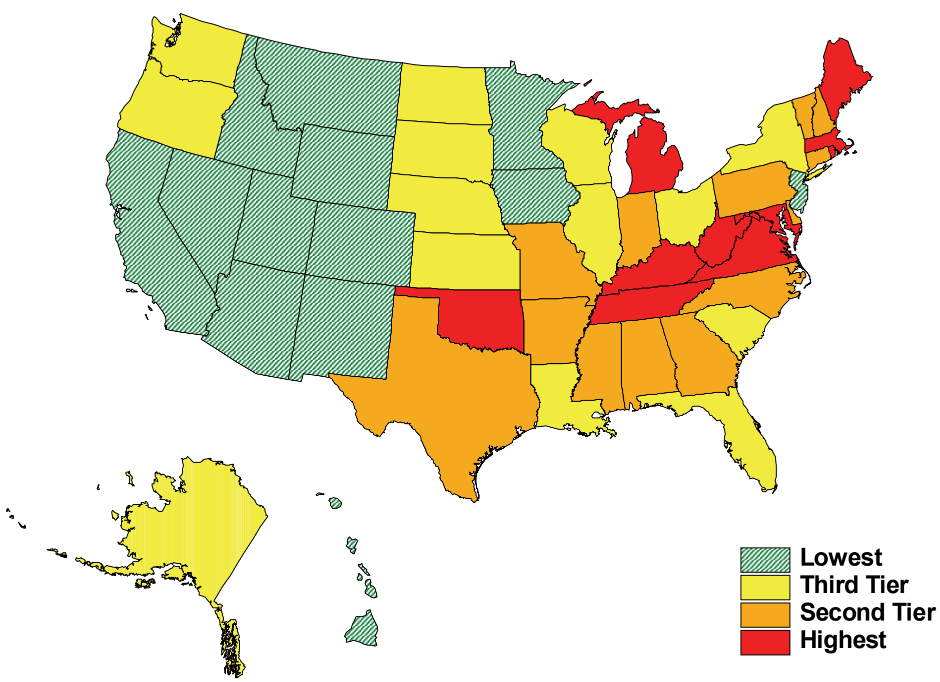
Residents of states that score high in smoking (such as Michigan and West Virginia) are also at greater risk for pulmonary conditions. The bottom five states tend to rely less on coal power and, with the exception of Florida, are less urbanized.

Pulmonary Conditions Population Reporting Condition - As Percentage of Male Population, 2003

Top Five States	Percent	Bottom Five States	Percent
Kentucky	24.79	Hawaii	9.97
Michigan	21.03	Nevada	11.75
Maine	20.91	New Mexico	11.93
Massachusetts	20.91	Utah	13.17
West Virginia	20.49	Wyoming	13.35

Sources: MEPS, Milken Institute

Population Reporting Pulmonary Conditions - Per Capita, 2003



DIABETES

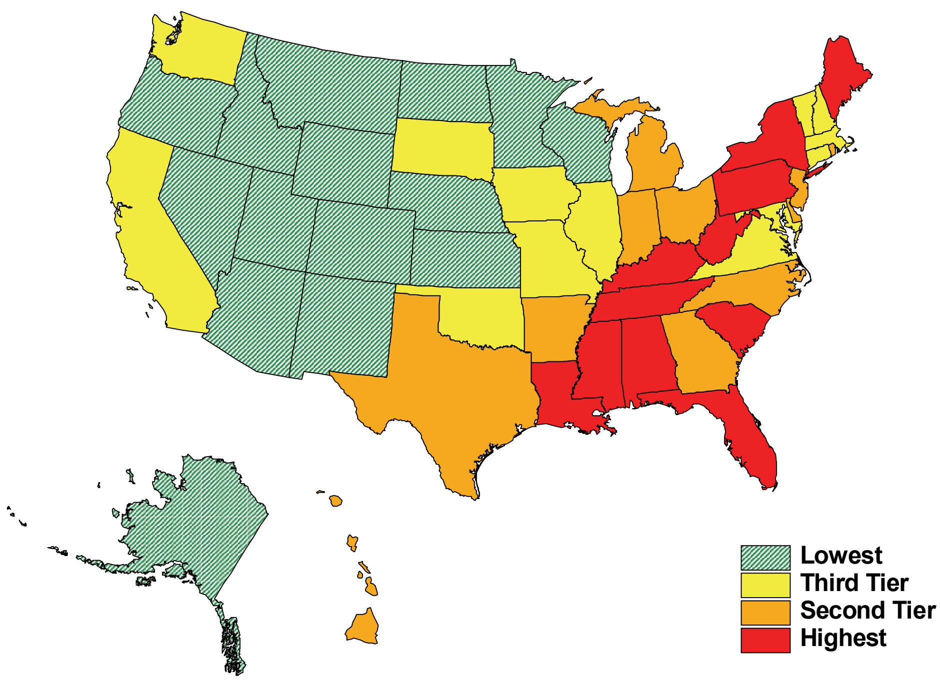
Diabetes rates are highest in states reporting the greatest combinations of risk factors, both avoidable and uncontrollable. The most important avoidable factor appears to be diet, with Southern states (where one typically finds fried foods, higher alcohol consumption, and greater rates of obesity) showing the highest overall PRC levels.

Diabetes Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
Mississippi	6.89	Colorado	2.90
West Virginia	6.14	Alaska	3.08
Tennessee	5.89	Minnesota	3.22
South Carolina	5.83	Montana	3.39
Pennsylvania	5.73	Utah	3.39

Sources: MEPS, Milken Institute

Population Reporting Diabetes - Per Capita, 2003



HYPERTENSION

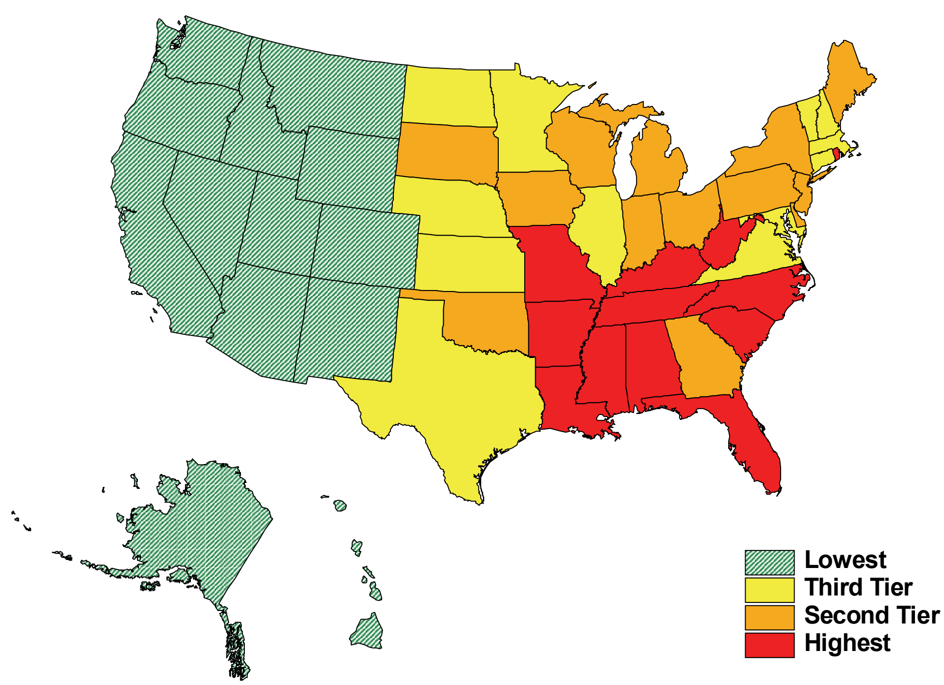
Avoidable risks, such as poor diet, low exercise rates, and alcohol consumption, play roles. The states with highest hypertension rates are known for local cuisines heavy in fried foods, and each state ranks among the top ten in obesity rates. Of the five states scoring lowest disease rates, three—Utah, Alaska, and New Mexico—also report the lowest cholesterol risks. The following map depicts striking differences in the concentration of hypertension in the Southeast and West.

Hypertension Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
West Virginia	16.62	Utah	8.29
Mississippi	16.52	Colorado	8.73
Alabama	16.37	Alaska	9.18
Arkansas	15.09	New Mexico	9.31
Tennessee	14.99	Montana	9.40

Sources: MEPS, Milken Institute

Population Reporting Hypertension - Per Capita, 2003



HEART DISEASE

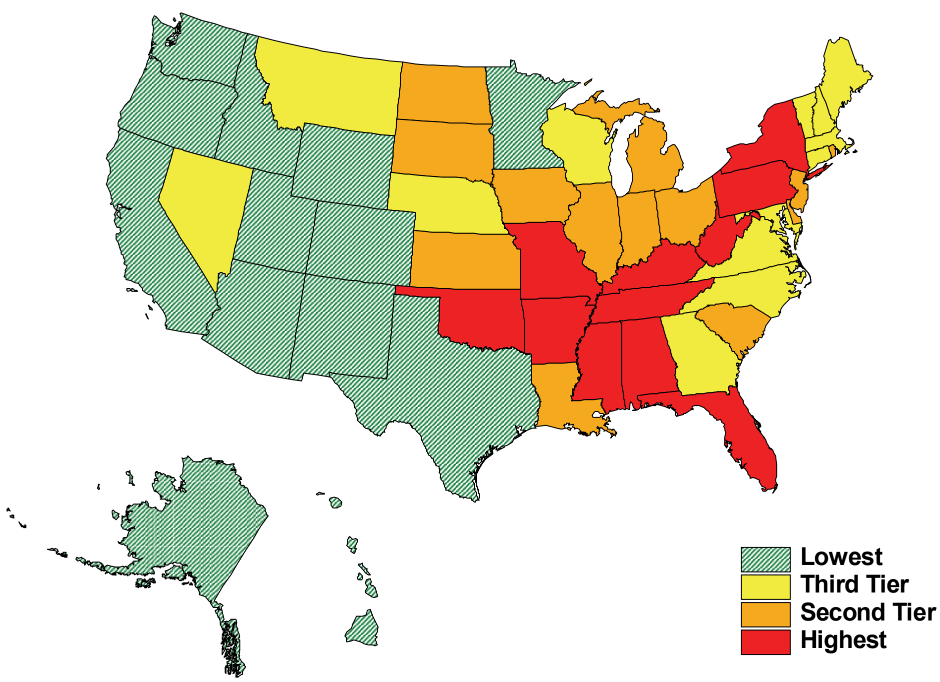
Avoidable risk factors, such as poor diet and lack of exercise, play significant roles. Four of the five states reporting the highest heart disease rates score among the bottom ten for exercise rates. Three of the five states reporting the lowest disease rates—Utah, Colorado, and Minnesota—are among the top five for exercise rates. Alaska, where diet includes significant amounts of fish, leads the list of states reporting lowest heart disease rates. Alaska also ranks among the top ten states reporting high exercise rates. New Mexico, also among the bottom five, has the second-lowest risk level for high cholesterol.

Heart Disease Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
West Virginia	9.82	Alaska	2.61
Oklahoma	9.07	Utah	3.43
Mississippi	8.67	Colorado	3.86
Alabama	8.40	Minnesota	4.59
Pennsylvania	8.23	New Mexico	4.89

Sources: MEPS, Milken Institute

Population Reporting Heart Disease - Per Capita, 2003



STROKE

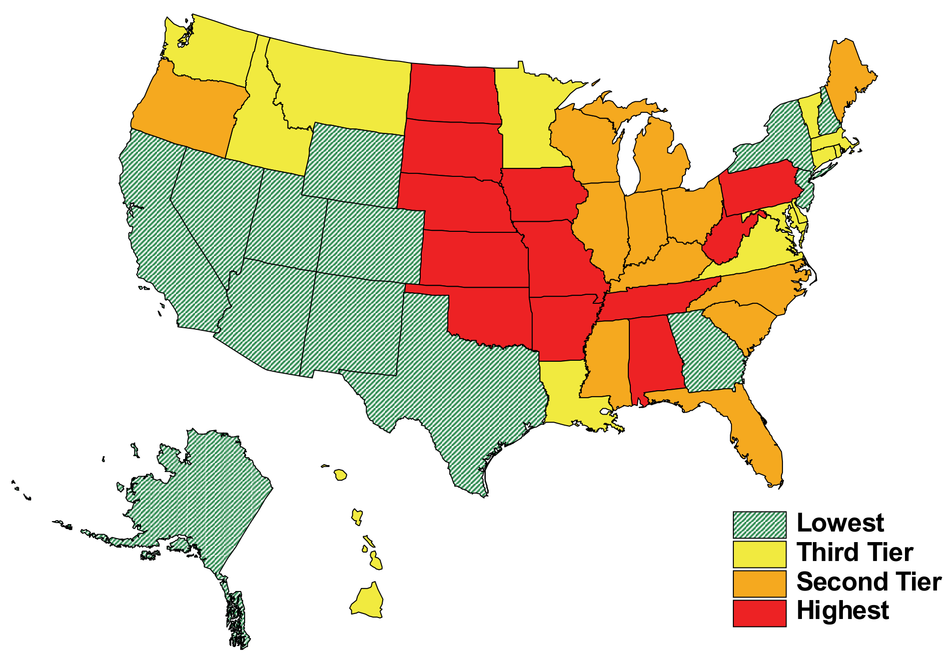
Risk for stroke depends not only of the avoidable and unavoidable factors but also on the level of treatment. North Dakota, for example, which shows the highest disease rate, doesn't rank among the top states for obesity, but it has the highest percentage of population considered "overweight" (39.2 percent). As noted previously, rural areas often report lower rates of stroke, but also lower treatment rates. Non-Hispanic whites are at higher risk. This may also help explain the high stroke rates in North Dakota and Iowa. Meanwhile, Arkansas, West Virginia, and Pennsylvania also rank among the top five for heart disease and report high cholesterol rates. Four of the five states with the lowest stroke levels also are among the five with lowest levels of hypertension.

Stroke Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
North Dakota	1.23	Alaska	0.39
Arkansas	1.18	Utah	0.50
Iowa	1.16	Colorado	0.54
West Virginia	1.11	New Mexico	0.56
Pennsylvania	1.09	Arizona	0.59

Sources: MEPS, Milken Institute

Population Reporting Stroke - Per Capita, 2003



MENTAL DISORDERS

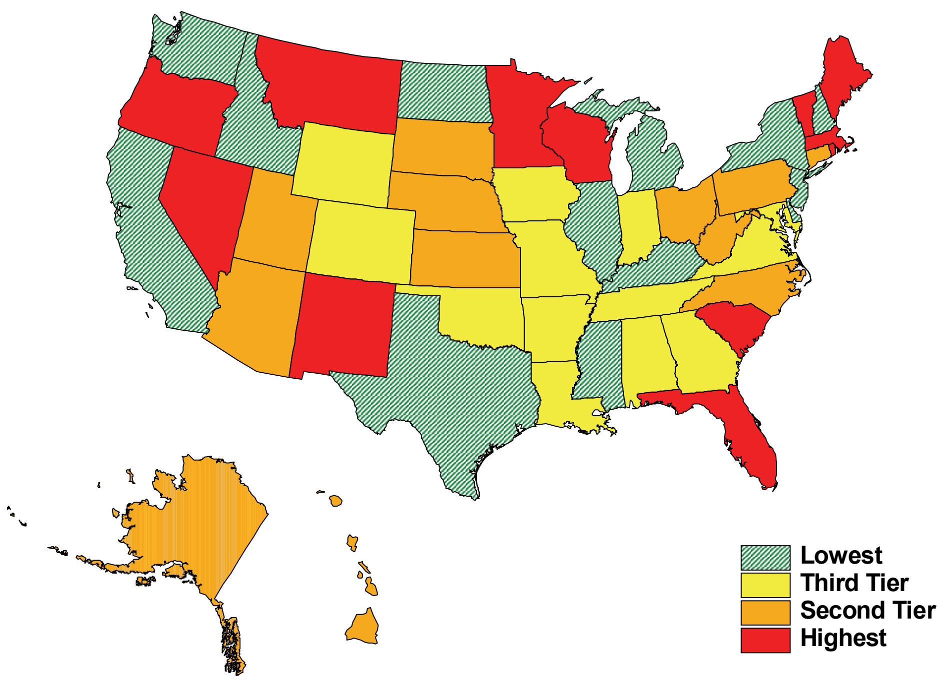
Geographic distribution is extremely diverse. Environmental factors vary widely, even within states. Alcohol consumption and drug use are avoidable risk factors whose levels are documented by state. Massachusetts (2nd), Rhode Island (8th), Vermont (6th), Nevada (11th), and Wisconsin (4th) rank in the top ten for both risk categories. However, other factors are involved, including levels of diagnosis, prevention efforts, and genetics.

Mental Disorders Population Reporting Condition - As Percentage of Population, 2003

Top Five States	Percent	Bottom Five States	Percent
Oregon	17.59	Washington	5.01
Massachusetts	16.97	North Dakota	6.64
Montana	15.41	California	7.15
Wisconsin	14.83	Pennsylvania	8.17
Minnesota	14.81	Mississippi	8.34

Sources: MEPS, Milken Institute

Population Reporting Mental Disorders - Per Capita, 2003



II: Projecting Avoidable Direct Costs

A. Assumptions and Simulations

If one quits smoking or begins an exercise regimen, the benefits are quickly felt. But long-term projections are necessary in order to appreciate the broad impacts of behavioral change and improved therapies on chronic disease and treatment costs.

In this section, we begin by discussing three models—an aging-only demographic scenario; a pooled cross-sectional model measuring the relationships between behavioral risk factors and selected disease; and a model depicting the path of screening and treatment innovation.

Utilizing these models—two of which include their own baseline and optimistic assumptions—we run simulations to build twenty-year projections for overall baseline and optimistic incidence and prevalence rates, PRC totals, and treatment costs. These projections appear in Section B.

Model 1: Aging-Only Demographic

Model 1, the aging-only demographic, relies on U.S. Census population projections, which call for a rise in the 65-and-over share over the twenty-year period: from 12.4 percent in 2003 to 17.4 percent by 2023. We assume no changes in the 2003 values for behavioral or demographic risk factors over the projection period, and use the following population cohorts:

50-and-over share

This share slipped from 25.9 percent in 1983 to 25.5 percent in 1992. As baby boomers began to enter the 50-and-over age group, their share of overall population increased, reaching 28.5 percent in 2003. The share is projected to reach 35.6 percent in 2023.

The female 50-and-over share of the population slipped from 28.2 percent in 1983 to 27.8 percent in 1992. The first of the baby boomers reached 50 in 1996, and by 2003, the 50-and-over female share rose to 30.6 percent. By 2023, the share is projected to hit 37.6 percent.

Meanwhile, the male 50-and-over share of the population is projected to rise from 26.3 percent in 2003 to 33.6 percent in 2023. By age 50, this segment is likely to see increased rates of diabetes and hypertension.

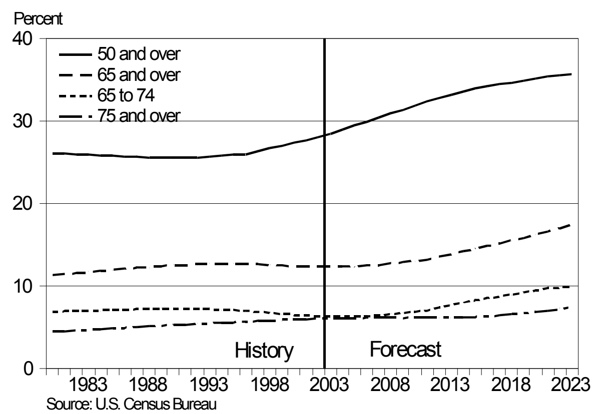
65-and-over share

The 65-and-over population share is projected to increase from 12.4 percent in 2003 to 17.4 percent in 2023. Over the next twenty years, these aging baby boomers will have a significant impact on incidence rates for most chronic conditions, and particularly for heart disease, hypertension, and stroke (more than 75 percent of strokes occur in people over age 65).

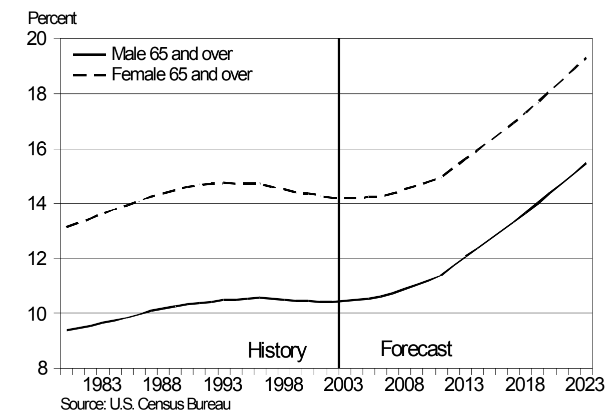
In 1983, the share of the male population over age 65 totaled 9.7 percent. This figure edged up to 10.5 percent in 2003. The first baby boomer males will reach 65 in 2011, and the population share will increase substantially in 2023, to 15.5 percent.

While the 65-and-over male population share increases by 47.6 percent in the next twenty years, the female population share will also increase, but by just 35.9 percent, from 14.2 percent in 2003 to 19.3 percent by 2023.

Population Projections - By Age Group



Population Projections - 65 and over



65–74 share

This age group dipped from 7.0 percent of the population in 1983 to 6.3 percent in 2003. As the first boomers enter the bracket in 2011, they are expected to represent nearly 10 percent of the total population, an increase of 57 percent from 2003.

75-and-over share

The 75-and-over share climbed from 4.7 percent in 1983 to 6.1 percent in 2003. This share is expected to reach 7.5 percent in 2023, increasing at a slower rate over the next twenty years than it did in the previous two decades.

To derive projections of incidence/prevalence rates for Model 1, we apply the 2003 age-specific incidence and prevalence rates, shown in the next two tables, to the census projections from 2004 to 2023. The results are straightforward forecasts of how disease rates change as the population ages.

Age-Specific Incidence Rates - Per 100,000 Population, 2003

Cancer	Age 0-49	Age 50-54*	Age 55-64	Age 65-74	Age 75 and over
Cancer	94.4	645.0	1035.4	1917.3	2319.0
Breast Cancer	42.4	258.2	319.4	397.9	416.5
Colon Cancer	5.7	60.0	93.1	205.5	339.0
Lung Cancer	4.6	57.1	134.4	325.8	380.7
Prostate Cancer	5.6	184.7	453.9	936.1	834.0
Other Cancers*	60.3	305.6	423.8	743.0	1026.2

* Incidence specific to the age cohort 50-54 was constructed using the given age cohort 50-and-over, 55-64, and 65 and over.

Source: National Cancer Institute

As the preceding table shows, cancer incidence rates tend to progress aggressively as people age. The following table shows that the prevalence rate for diabetes in 2003 was greatest in the 65–74 age group. Heart disease, hypertension, and stroke also occurred more frequently in the 75-and-over age group.

Age-Specific Prevalence - Percent, 2003

Chronic Disease	Age 25-44	Age 45-49**	Age 50-64	Age 65-74	Age 75 and over
Pulmonary Conditions*	12.6	14.4	17.9	20.7	17.8
Diabetes	2.3	5.9	11.2	18.1	15.8
Hypertension	8.9	19.2	35.1	49.3	54.8
Heart Disease	4.5	7.8	14.6	27.3	36.8
Stroke	0.5	1.1	3.0	7.1	11.6

* Prevalence of pulmonary conditions includes those with asthma, emphysema, and chronic bronchitis.
**Prevalence specific to the age cohort 45-49 were constructed using the given age cohorts of 44-64 and 50-64.

Source: Centers for Disease Control and Prevention

The following two tables reflect projections of the 2003 incidence and prevalence rates. No other variables are at play. We find that aging of the population, by itself, will lead prostate cancer incidence rates to climb 36 percent over the two decades: from 152 to 208 per 100,000 people. With respect to prevalence rates, age generates the greatest impacts on heart disease, hypertension, and stroke.

Incidence Projections - Based on Aging, Thousands

Cancer

Year*	Age 0-49	Age 50-54	Age 55-64	Age 65-74	Age 75 and over	All ages	Incidence rate**
2003	196.3	122.8	288.2	351.7	408.1	1,367	470.1
2013	199.8	145.5	401.9	468.3	455.1	1,671	526.5
2023	208.9	133.6	434.3	657.3	599.0	2,033	622.7

Breast Cancer

Year*	0-49	50-54	55-64	65-74	75 and over	All ages	Incidence rate**
2003	43.5	25.1	46.1	39.8	45.8	200.3	135.5
2013	44.3	29.7	64.2	52.1	50.3	240.5	149.3
2023	46.2	27.1	68.9	72.8	64.4	279.4	159.8

Colon Cancer

Year*	0-49	50-54	55-64	65-74	75 and over	All ages	Incidence rate**
2003	11.9	11.4	25.9	37.7	59.7	146.5	50.4
2013	12.1	13.6	36.1	50.1	66.4	178.2	56.2
2023	12.6	12.4	39.0	70.2	87.2	221.5	64.4

Lung Cancer

Year*	0-49	50-54	55-64	65-74	75 and over	All ages	Incidence rate**
2003	9.6	10.9	37.4	59.8	67.0	184.6	63.5
2013	9.7	12.9	52.2	79.4	74.6	228.8	72.2
2023	10.2	11.8	56.4	111.4	97.9	287.7	83.6

Prostate Cancer

Year*	0-49	50-54	55-64	65-74	75 and over	All ages	Incidence rate**
2003	5.9	17.2	60.8	78.2	55.1	217.1	151.8
2013	6.0	20.5	85.0	105.5	62.7	279.6	179.5
2023	6.3	18.9	92.3	148.8	85.5	351.8	208.1

Other Cancers

Year*	0-49	50-54	55-64	65-74	75 and over	All ages	Incidence rate**
2003	125.5	58.2	118.0	136.3	180.6	618.6	212.7
2013	127.7	69.0	164.5	181.1	201.1	743.4	234.5
2023	133.6	63.3	177.7	254.0	263.9	892.6	259.5

*Selected years for twenty-year projection

** New cases per 100,000 population (using female population for breast cancer, and male population for prostate cancer)

Source: Milken Institute

Prevalence Projections - Based on Aging, Thousands

Pulmonary Conditions

Year*	Age 25-44	Age 45-49	Age 50-64	Age 65-74	Age 75 and over	Age 25 and over	Prevalence** (%)
2003	10.6	3.1	8.4	3.8	3.1	29.1	16.1
2013	10.6	3.1	11.0	5.0	3.5	33.2	16.4
2023	11.2	2.9	11.2	7.1	4.6	37.0	16.5

Diabetes

Year*	25-44	45-49	50-64	65-74	75 and over	25 and over	Prevalence** (%)
2003	1.9	1.3	5.2	3.3	2.8	14.6	8.1
2013	1.9	1.2	6.9	4.4	3.1	17.6	8.7
2023	2.1	1.2	7.0	6.2	4.1	20.5	9.1

Hypertension

Year*	25-44	45-49	50-64	65-74	75 and over	25 and over	Prevalence** (%)
2003	7.5	4.2	16.5	9.0	9.7	46.8	26.0
2013	7.5	4.1	21.5	12.0	10.7	55.9	27.7
2023	7.9	3.8	22.0	16.9	14.1	64.7	28.9

Heart Disease

Year*	25-44	45-49	50-64	65-74	75 and over	25 and over	Prevalence** (%)
2003	3.8	1.7	6.8	5.0	6.5	23.8	13.2
2013	3.8	1.7	9.0	6.7	7.2	28.3	14.0
2023	4.0	1.6	9.1	9.3	9.5	33.5	14.9

Stroke

Year*	25-44	45-49	50-64	65-74	75 and over	25 and over	Prevalence** (%)
2003	0.4	0.2	1.4	1.3	2.0	5.4	3.0
2013	0.4	0.2	1.8	1.7	2.3	6.5	3.2
2023	0.4	0.2	1.9	2.4	3.0	7.9	3.5

Mental Disorders

Year*	0-24	25-44	45-54	55-64	65 and over	All ages	PRC rate *** (%)
2003	202	1,924	1,823	1,303	25,086	30,338	10.4
2013	211	1,918	1,961	1,817	30,690	36,597	11.5
2023	223	2,039	1,814	1,963	41,812	47,850	13.9

*Selected years for twenty-year projection
** Percent of U.S. population age 25 and over
*** Population Reporting Condition (PRC) divided by U.S. population
Source: Milken Institute

Model 2: Pooled, Cross-Sectional Model

Model 2 builds on Model 1 by taking the census-based aging demographic projections and quantifying the impacts of selected demographic and behavioral risk factors on them. Thus, we build assumptions into the demographics—assumptions about age, race, air quality, weight, activity levels, smoking, and alcohol consumption.

To quantify the impacts of risk factors on aging demographics, it is necessary to construct state cross sections, pooled over time, to allow for more significant variation across risk factors. There will be eleven such pooled models, one for each profiled disease category. (These will be addressed below.) We develop baseline and optimistic assumptions for each risk factor, and optimistic and baseline projections of incidence/prevalence for each pooled model.

The assumptions include:

Demographic Risk Factor Assumptions

African-American share of the population

The African-American share of the population is projected to increase from 12.8 percent in 2000 to approximately 14.0 percent in 2023. The prevalence of asthma is greater among African Americans, and the changing composition of the general population will drive this component of the baseline forecast for incidence and prevalence. African Americans are more likely than the general population to develop heart disease, and African-American males are more prone to prostate cancer.

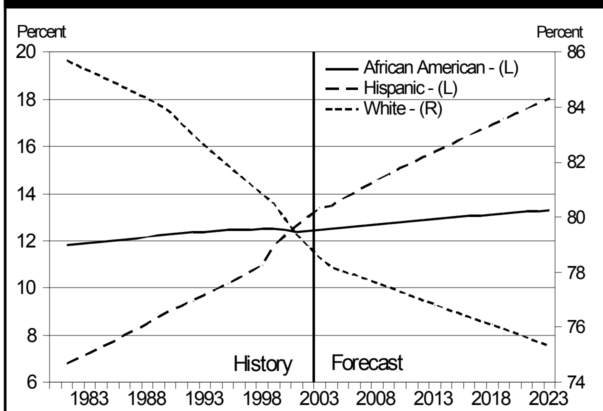
Hispanic share of the population

Between 1990 and 2000, the Hispanic share rose from 9.0 percent to 11.3 percent. In 2023, it is projected to increase to 16.5 percent, pushing up prevalence rates in diabetes and heart disease, holding all other factors constant. In fact, the biggest racial/ethnic factor affecting diabetes prevalence over the next twenty years will be the rising share of the Hispanic population.

White share of the population

The white, non-Hispanic share of the population is projected to decline, from 80 percent in 2000 to 75.3 percent in 2023. But its share of the 65-and-over population will not decline as rapidly.

Population Projections - By Race



Source: U.S. Census Bureau

Changing patterns of age and race/ethnicity will likely have a significant impact on the nation's future health, but reducing or eliminating behavioral risks can delay the onset or diminish the severity of these diseases. In our models, the following risk factors generated the largest and most significant impacts.

Behavioral and Other Risk Factor Assumptions[32]

Numbers of Overweight/Obese Americans

Overweight and obese Americans face far-reaching consequences for their quality and length of life. The rising numbers of overweight and obese Americans threaten to create an epidemic of chronic disease. The strong links between high body mass index (BMI) and diabetes, cancer, cardiovascular disease, and psychological disturbances (including depression) mean that treatment costs are likely to escalate.

Obesity was responsible for some 400,000 deaths in 2004, according to a CDC report, and will overtake smoking as the top preventable cause of death in the country.[33] Increases in body mass index and obesity have been observed across all racial, ethnic, gender, and age groups. Hispanic and African-American girls and women have seen the greatest increases in obesity, but the nationwide total of overweight and obese children has doubled since 1980 and tripled for adolescents. Among children, type 2 diabetes has increased tenfold since 1980.[34] Among adults, the prevalence of obesity has soared from 14.4 percent in the period 1976–1980 to 30.5 percent by 1999–2000. Over the same time, the population share of overweight individuals increased from 46 percent to 64.5 percent. More than one-third of American women over 45 are obese.[35]

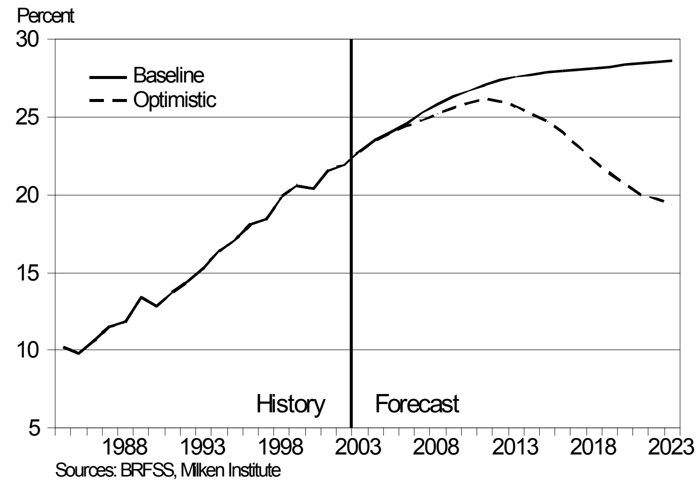
To obtain historical times-series information (1984–2003) at the national level consistent with state-level data, we refer to the CDC's Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS was established to overcome the deficiencies of national studies since state health agencies assume the primary roles of targeting resources to reduce behavior risks. However, the BFRSS data contain self-reported bias, and true BMI, particularly for females, is often under-reported.

Baseline assumptions: The baseline scenario calls for the rate of obesity to moderate and begin to plateau around 2015. We assume that the prevalence of overweight conditions grows at about half the historical increase, or 43.6 percent, in 2023. Obesity increases to 28.7 percent in 2023.

Optimistic assumptions: A change in unhealthy behaviors, combined with therapeutic-compound effects, will significantly influence the upward trends of obesity. Wellness programs will affect BMI through diet, exercise, leisure activities, and education. Overweight prevalence will drop to 32.2 percent of the population in 2023, and obesity will fall to 19.4 percent.

32. Other risk factors, such as red meat consumption, and diets high in sodium and fat, were examined but were not included in our models due to limited data.
33. Cigarette Smoking-Attributable Morbidity: United States, 2000. *Morbidity and Mortality Weekly Report*. 2003; 52(35): 842-844. See: http://www.cdc.fog/mmwr/preview/mmwrhtml/mm5235a4.htm.
34. National Center for Chronic Disease Prevention and Health Promotion. Obesity Trends: U.S. Obesity Trends 1985–2003. Atlanta, Georgia: Centers for Disease Control and Prevention. See: http://www.cdc.gov/nccdphp/ dnpa/obesity/trend/maps/index.htm
35. American Obesity Association. www.obesity.org.

Obesity (BMI>30) - As Percent of Population



We assume that male and female obesity will follow the same trends. Obesity prevalence will decline to 19.7 percent for men and 19.2 percent for women in 2023.

Smoking

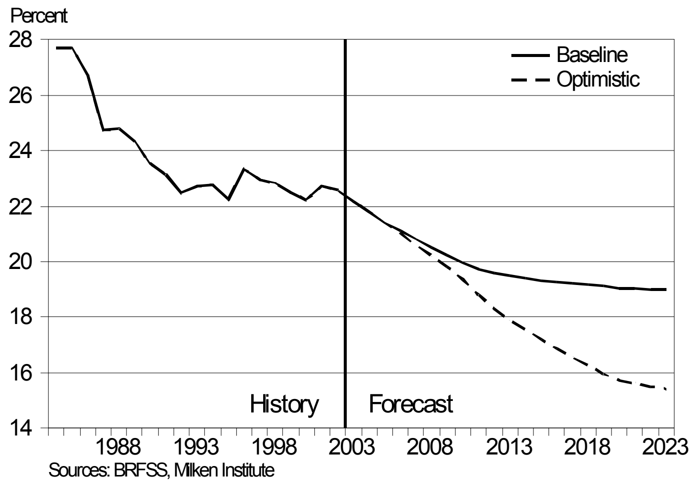
Cigarette smoking, like obesity, serves as a primary behavioral risk factor for various chronic diseases, namely, lung and colon cancer, heart disease, stroke, and asthma. Substantial taxation and other recent increases in tobacco prices have helped cut smoking rates. But the most significant drops in smoking took place after 1966, in the wake of the surgeon general's 1964 report on the negative health effects of tobacco.[36] In 1966, adult smokers constituted 43 percent of the population. From 1985 to 2004, adult smoking fell from 30.1 percent to 20.9 percent, a drop of 31 percent. In the forty years from 1965 to 2004, the decline in smoking was slightly more than 50 percent.[37]

Baseline assumptions: Smoking declines at the same rate it fell between 1985 and 2005. The percentage of "at risk" smokers (individuals who smoke at least 100 cigarettes over their lifetime and who still smoke) will fall to 19 percent in 2023.[38]

Optimistic assumptions: Smoking declines at the same rate it dropped between 1965 and 2004. In 2023, approximately 15.4 percent of the adult population will smoke.

36. Jasper Womach, "U.S. Tobacco Production, Consumption, and Export Trends," (Congressional Research Services, 2003).
37. "Smoking 101 Fact Sheet," American Lung Association, http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=39853. (Accessed May 3, 2007).
38. Smoking statistics come from a BRFSS survey question.

"At Risk" Smoking - As Percent of Population



Alcohol Consumption

Heavy alcohol consumption may lead to the onset of various cancers and mental disorders, such as depression. A number of studies argue that higher prices may result in less consumption, but for heavy drinkers and those considered "at risk," as defined by CDC as two or more drinks a day, this may not be the case. Price increases have had less effect on heavy drinkers than on moderate drinkers.[39] Per capita alcohol consumption has been relatively stable in recent years, averaging 24.7 gallons per person per year in 1995 and 25.2 gallons per person per year in 2004.[40] This trend suggests that alcohol consumption will remain relatively constant.

According to BRFSS, 5.8 percent of the population was classified as "at risk" in 2003, down from 8.9 percent in 1984.

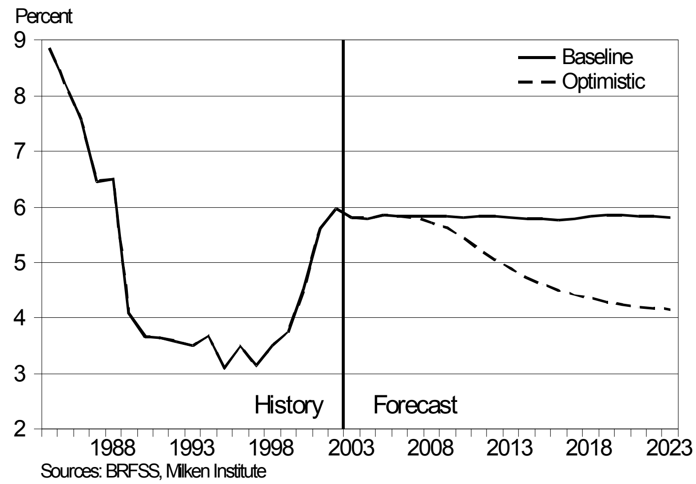
The following graph depicts a decline of "at risk" drinking in the Eighties that stabilized throughout the Nineties. The drop can be attributed to alcohol awareness campaigns.

Baseline assumptions: The "at risk" percent of the population remains unchanged at 5.8 percent.

Optimistic assumptions: The percentage of "at risk" population decreases steadily to 4.2 percent. Raising awareness of the adverse effects—in particular, the links to chronic diseases—will lead to lower alcoholic consumption per capita.

39. Willard G. Manning et al. "Price of Alcohol Reduces Moderate Drinker Intake: Has Less Effect on Heavy Drinkers." Research Brief. Institute for Health Services Research. University of Minnesota School of Public Health. April 1993.
40. U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States*, 2007 edition, Table 201. See: http://www.census.gov/compendia/statab/health_nutrition/.

"At Risk" Drinking - As Percent of Population



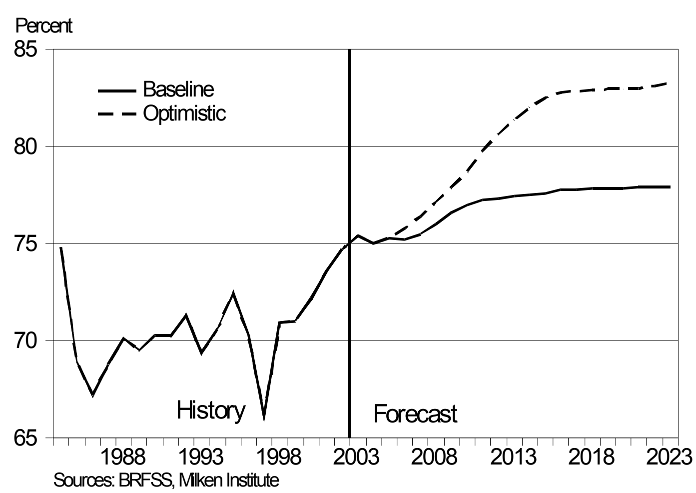
Physical Activity

Using data from BRFSS we assume an upward trend in the share of the population exercising regularly.[41]

Baseline assumptions: The percent share of the population engaged in physical activity will increase gradually, from 75.4 in 2003 to 77.9 in 2023.

Optimistic assumptions: The population share engaged in physical activity will increase to 83.3 percent by 2023.

Physical Activity Particiation - As Percent of Population



41. We rely specifically on responses to the question "Have you ever participated in walking, running, etc. … in the past month?"

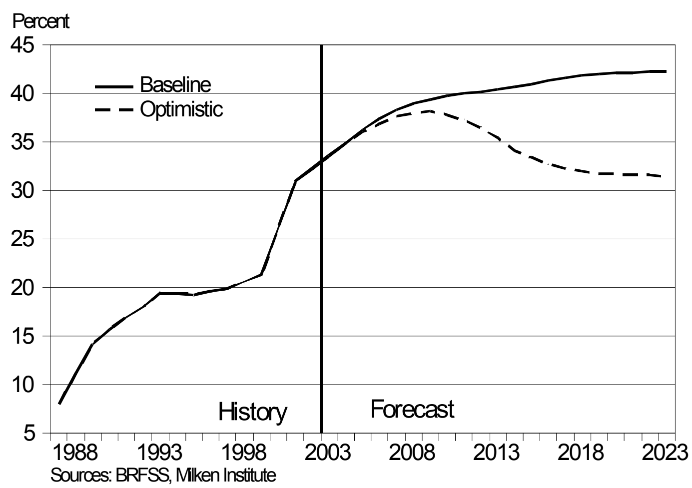
High Cholesterol

BRFSS data is useful for obtaining information on the percentage of the population screened for high cholesterol, which can lead to cardiovascular disease. The percentage of people diagnosed with high cholesterol jumped from 19.4 percent in 1994 to 33.6 percent in 2003, up 72.7 percent. Much of the increase, however, is attributed to more patients undergoing screening.

Baseline assumptions: We expect the population share with high cholesterol to stabilize at around 42.2 percent in 2023.

Optimistic assumptions: Increased awareness of diet and nutrition, and their impacts on healthy aging, will help lower cholesterol levels. We assume that the population percentage with high cholesterol will drop to 31.5 in 2023.

High Blood Cholesterol - As Percent of Population



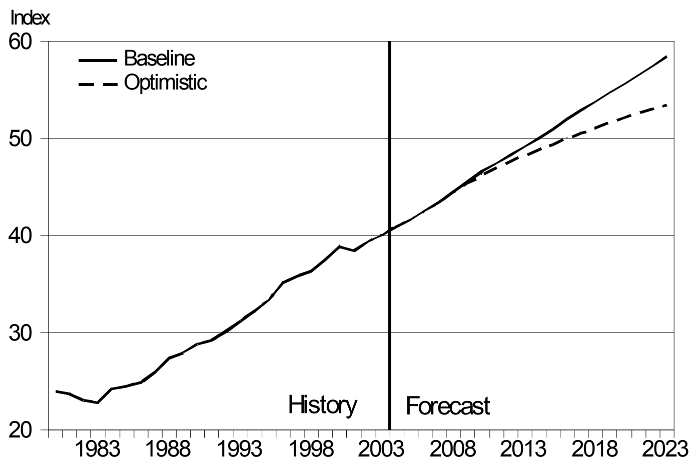
Air Quality

We use air quality as an indicator for levels of air pollution. The higher the index, the higher the level of air pollution.

Baseline assumptions: To capture a historical trend, we create a national air quality index that captures growth in fuel demand (as measured in BTUs) and population, based on data from the Environment Protection Agency (EPA). We assume that demands for fuel will increase as the population grows, causing the index to follow its historical trend. As a result, air quality worsens steadily, from 40.1 in 2003 to 58.4 in 2023, an increase of 46 percent.

Optimistic assumptions: We assume a net reduction in air pollution and other allergens and irritants attributed to more environmentally friendly fuel alternatives and/or incentives, such as ridesharing and low-emission vehicles. Air pollution increases at a slower pace, reaching a level of 53.5 on the index in 2023.

Air Quality Index



Sources: Global Insight, U.S. Census, Milken Institute

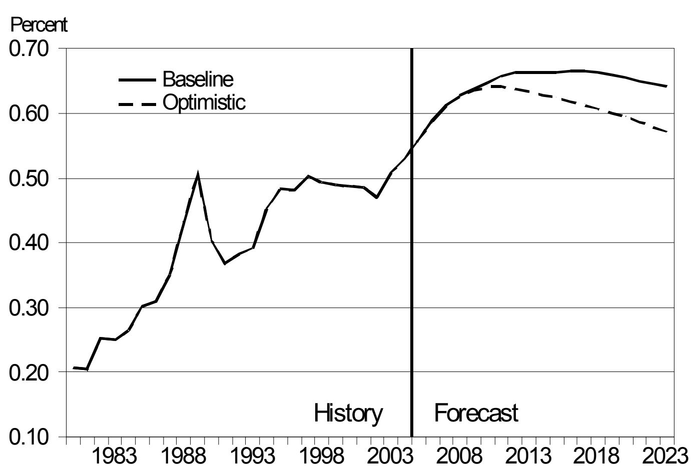
Illicit Drug Use

In order to capture a historical trend, we use data on arrest numbers from the Department of Justice's "Annual Crime Reports," produced by the Bureau of Justice.[42]

Baseline assumptions: We assume that the usage trend will plateau in the next twenty years, attributable to increased awareness of the adverse effects of illicit drug use and stricter law enforcement policies. The number of arrests as a share of the total population will climb to 0.64 percent in 2023, an increase of 14.2 percent from 2005.

Optimistic assumptions: We assume that the number of arrests as a share of the total population will decline at a faster rate, ultimately reaching 0.57 percent by 2023.

Estimated Adult Arrests for Drugs Abuse Violations - As Percent of Population



Sources: Bureau of Justice Statistics, U.S. Census, Milken Institute

42. Bureau of Justice. "Estimated Arrests for Drug Abuse Violations by Age Group, 1970-2005." See: http://www.ojp.usdoj.gov/bjs/glance/tables/drugtab.htm.

Assumptions Based on Demographic Risk Factors

Risk Factors	Chronic Conditions Impacted	Unit of Measurement	1980-1985	2000-2005	2023 baseline	2023 optimistic
Male Population 25-44	asthma	as % of total male population	30.3%	29.6%	26.7%	–
Male Population 45-64		as % of total male population	18.7%	23.4%	24.0%	–
Male Population under 50	asthma	as % of total male population	76.5%	73.7%	66.4%	–
Male Population 50+	prostate, colon cancer	as % of total male population	23.5%	26.3%	33.6%	–
Male Population under 65		as % of total male population	90.3%	89.5%	84.5%	–
Male Population 65+	heart disease, stroke, any cancer	as % of total male population	9.7%	10.5%	15.5%	–
Male Population 50-64	prostate, colon cancer	as % of total male population	13.8%	15.9%	18.1%	–
Male Population 55-64	prostate, colon cancer	as % of total male population	9.1%	9.4%	12.0%	–
Male Population 65-74	heart disease, stroke, any cancer	as % of total male population	6.3%	5.8%	9.4%	–
Male Population 75+	heart disease, stroke, any cancer	as % of total male population	3.4%	4.6%	6.1%	–
Female Population 25-44	asthma	as % of total female population	29.2%	28.3%	25.3%	–
Female Population 45-64		as % of total female population	19.4%	23.8%	24.0%	–
Female Population under 50	asthma	as % of total female population	71.8%	69.4%	62.4%	–
Female Population 50+	breast, colon cancer	as % of total female population	28.2%	30.6%	37.6%	–
Female Population under 65		as % of total female population	86.4%	85.8%	80.7%	–
Female Population 65+	heart disease, stroke, any cancer	as % of total female population	13.6%	14.2%	19.3%	–
Female Population 50-64	breast, colon cancer	as % of total female population	14.6%	16.4%	18.3%	–
Female Population 55-64	breast, colon cancer	as % of total female population	9.8%	9.8%	12.3%	–
Female Population 65-74	heart disease, stroke, any cancer	as % of total female population	7.7%	6.8%	10.5%	–
Female Population 75+	heart disease, stroke, any cancer	as % of total female population	5.9%	7.4%	8.8%	–
Population 25-44	asthma	as % of total population	29.7%	29.0%	26.0%	–
Population 45-64		as % of total population	19.0%	23.6%	24.0%	–
Population under 50	asthma	as % of total population	74.1%	71.5%	64.4%	–
Population 50+	cancer of lung and colon	as % of total population	25.9%	28.5%	35.6%	–
Population under 65		as % of total population	88.3%	87.6%	82.6%	–
Population 65+	heart disease, stroke, any cancer	as % of total population	11.7%	12.4%	17.4%	–
Population 50-64	breast, prostate, colon cancer	as % of total population	14.2%	16.1%	18.2%	–
Population 55-64	breast, prostate, colon cancer	as % of total population	9.5%	9.6%	12.2%	–
Population 65-74	heart disease, stroke, any cancer	as % of total population	7.0%	6.3%	9.9%	–
Population 75+	heart disease, stroke, any cancer	as % of total population	4.7%	6.1%	7.5%	–
African-American population	diabetes, heart disease, prostate cancer	as % of total population	10.6%	12.8%	14%	–
Hispanic population	diabetes, heart disease	as % of total population	5.7%	11.3%	16.5%	–
White population		as % of total population	85.3%	78.5%	75.3%	–

Assumptions Based on Behavioral Risk Factors

Risk Factors	Chronic Conditions Impacted	Unit of Measurement	1980-1985	2000-2005	2023 baseline	2023 optimistic
Smoking	cancer of lung and colon, asthma, heart disease, stroke	as % of total population	27.7%	22.2%	19.0%	15.4%
Alcohol	cancer of breast and colon, mental disorders ,heart disease, hypertension, stroke	as % of total population	8.9%	5.8%	5.8%	4.2%
Overweight (but not obese)	cancer of breast, colon and prostate, diabetes, heart disease, hypertension, stroke	as % of total population	28.6%	36.6%	43.6%	32.2%
Obesity	cancer of breast, colon and prostate, diabetes, heart disease, hypertension, stroke	as % of total population	10.2%	22.8%	28.7%	19.4%
Physical Activity	all	as % of total population	74.8%	75.4%	77.9%	83.3%
Diets High in Cholesterol	heart disease, hypertension, stroke	as % of total patients	7.9%	33.6%	42.2%	31.5%
Air Quality	Asthma	Index	22.8	40.1	58.4	53.5
Illicit Drug Use	Mental Disorders	as % of total population	0.25%	0.51%	0.64%	0.57%

The following summary table shows the results of the eleven cross-sectional pooled models. The dependent variables—rates of disease incidence/prevalence/mortality—are shown in the left-hand column. The explanatory variables (in the successive right-side columns) include age and behavioral risk assumptions, such as race and smoking. (Projections for prevention and screening innovations are not included since these are calculated by a different method and are addressed in Model 3.)

The results, or estimated coefficients, show the relationships between each disease and the explanatory variables. The relative significance of those results (as indicated by their respective t-statistics, shown in parentheses) is also given. Generally, a t-statistic over 2.0 is significant. A coefficient with an associated t-statistic over 3.0 is considered highly significant.

The R-squared depicts the degree to which the independent variables (demographic and behavioral risk factors) explain the disease incidence/prevalence or death rates. The closer R-squared is to 1.0, the better the overall explanatory power of the model. The number of observations (N) is also provided for each regression.

Pooled Cross-Sectional Models[1]

Dependent Variable	Demographic factor: Age cohort: Age 50 and over	Age 65 and over	Age 65- 74	Age 75 and over	Race: African-American	White	Hispanic	Risk factor: Smoking	Obesity	Exercise	Drinking	Cholesterol	Drug Use	Air Quality	Statistics: R-Square	N
Breast Cancer[2]		0.9447*** (8.32)							0.3398*** (3.63)						0.980	153
Colon Cancer		0.4330*** (9.33)						0.5291*** (10.88)	0.0167 (0.18)	-0.4531** (-2.86)					0.991	153
Lung Cancer		0.2401*** (3.57)						0.9755*** (12.5)							0.578	153
Prostate Cancer[3]		0.4034*** (6.16)			0.0306** (2.43)				0.5204*** (7.93)						0.977	153
Other Cancers		0.2641*** (3.34)			-0.232** (-2.01)		0.0357** (2.55)	0.2142** (2.16)	0.3036*** (5.93)		0.0282 (0.61)	0.1263** (2.24)			0.989	108
Asthma[4]							0.0372** (2.11)	0.5877*** (7.9)						0.3252*** (4.82)	0.969	150
Diabetes	0.7520*** (8.26)				0.0842*** (10.93)				0.3647*** (4.39)						0.747	153
Hypertension	0.3735*** (6.12)								0.3101*** (5.74)	-0.9189*** (-7.7)					0.680	153
Heart Disease			0.4954** (2.16)	0.5046*** (3.88)				0.3214*** (3)	0.5243*** (3.72)	-1.2436*** (-4.99)					0.909	51
Stroke		0.3238*** (2.97)				0.3577*** (6.21)		0.6319*** (10.65)	0.1009 (0.67)						0.971	153
Mental Disorders		0.2489 (1.89)									0.1954** (2.15)		0.0656 (0.5)		0.134	153

*** Statistically significant at the 1 percent level or better
** Statistically significant at the 5 percent level or better
1. Controlling for income and educational attainment
2. Female population age 65 and over, and female percent of obesity are used for breast cancer.
3. Male population age 65 and over, and male percent of obesity are used for prostate cancer.
4. Prevalence of COPD is not available from BRFSS. Therefore, asthma prevalence is used for left-hand side variable.
Source: Milken Institute

The highlights of each regression model follow:

BREAST CANCER

The female 65-and-over population and the percentage of female obesity significantly explain incidence. As expected, the older females and those with a BMI above 30 are likely to have a higher incidence. Coefficients are highly significant, as indicated by their respective high t-values. (Again, a t-statistic over 2.0 is significant. A coefficient with an associated t-statistic over 3.0 is considered highly significant.) Aging, exhibited by the population 65 and over, yields the largest coefficient of 0.94. This would indicate that for 1.0 percent increase in the female population 65 and over, breast cancer incidence would increase by nearly 1.0 percent, holding all other factors constant. A 1.0 percent increase in the percentage of the obese adult female population indicates that incidence rises by 0.34 percent.

COLON CANCER

Smoking represents the most significant risk factor. The population 65 and over is also significant. Obesity and a higher percentage of "at risk" smokers are likely to increase incidence. A 1.0 percent change in smoking prevalence results in a 0.5 percent incidence change in the same direction. Since exercise is significant, we may conclude that incidence decreases with moderate exercise.

LUNG CANCER

Smoking and population 65 and over both exhibit high significance. A 1.0 percent change in smoking prevalence leads to a roughly 1.0 percent incidence change in the same direction. Lung cancer probability increases with age, reflecting the cumulative effect of a lifetime of unhealthy behaviors.

PROSTATE CANCER

Prostate cancer tends to occur more often in African Americans and men 65 and over. Male obesity is also a significant determinant. A 1.0 percent change in obesity prevalence leads to a 0.5 percent incidence change in the same direction.

OTHER CANCERS

Since "other cancers" are not specific to one type, we test against various behavioral and demographic factors. Obesity, smoking, and cholesterol display high significance in "other cancer" incidence, but demographic factors, particularly aging, also yield high correlation. A 1.0 percent change in obesity prevalence leads to 0.3 percent incidence change in the same direction.

ASTHMA

The onset of asthma[43] typically occurs to individuals under 40. Thus, we do not include age as a variable. Asthma is likely to be more prevalent among the Hispanic population, but the disease impact in that population is not large, as indicated by the small coefficient. Smoking and air quality appear to be major risk factors. A 1.0 percent change in smoking prevalence results in a 0.6 percent asthma prevalence change in the same direction. Air quality also seems to have a fairly significant impact.

43. BRFSS provides data only on asthma, as opposed to pulmonary conditions.

DIABETES

The population 65 and over appears to be the most significant factor increasing the prevalence of diabetes, which shows a cumulative impact over the life cycle. A 1.0 percent change in population 65 and over leads to almost 0.8 percent prevalence change in the same direction. Among behavioral risk factors, obesity has the strongest relationship with diabetes, apparent from the highly significant coefficient. Diet and exercise were not found to have independent impacts on diabetes separate from their influence on obesity.

HYPERTENSION

We use prevalence as the dependent variable. Age and obesity seem to be positively and significantly correlated. Exercise appears to significantly reduce occurrence of hypertension. Exercise was found to exhibit a notable and separate impact on hypertension from its associated link to obesity. A 1.0 percent increase in physical activity prevalence leads to a 0.3 percent decrease in hypertension prevalence.

HEART DISEASE

Due to the lack of state-level prevalence/incidence data, we use death rates as a proxy for the dependent variable. Age and obesity are the most significant factors, followed by smoking. Exercise appears to decrease the risk significantly. A 1.0 percent increase in physical activity prevalence leads to a 1.2 percent decrease in heart disease death rates.

STROKE

We use the death rates as the dependent variable due to the limitation of state prevalence data. Smoking appears to be the most significant behavioral risk factor, as indicated by its highly significant and large coefficient. A 1.0 percent change in the number of smokers results in over a 0.6 percent death rate change in the same direction.

MENTAL DISORDERS

We use death rates as the dependent variable due to limited data on incidence or prevalence rates. Heavy drinking and illicit drug use appear to increase mental disorders. Age is also a significant factor, with statistical significance at around 10.0 percent. This is partly attributable to the higher prevalence of other chronic diseases as we age. It is also attributable to death of a spouse. The widowed spouse can be highly susceptible to depression and other mental disorders. A 1.0 percent change in the population 65 and over leads to over a 0.2 percent change in the death rate.

These coefficients are applied to the baseline and optimistic assumptions. In this way it is possible to adjust the project incidence/prevalence rates based solely upon age for behavioral and other demographic risk factors.

Model 3: The Path of Screening and Treatment Innovation

Model 3 builds on Model 2, which calculated assumptions of risk factor trends into the aging demographic projections of Model 1. Now we estimate the positive values of improvements in screening, early intervention, and treatment. These impacts can be estimated into baseline and optimistic projections of prevalence and incidence.

Because state-level data is limited, we rely here on national-level date to build time-series regression models. Available data exist for just six of the disease categories under study—colon and prostate cancer, heart disease, hypertension, mental disorders, and stroke.

Early Detection/Screening: Colon Cancer and Prostate Cancer

In this model, we build in assumptions for early screening and detection to assess their impacts on colon and prostate cancer incidence rates. As noted earlier, when the PSA test was introduced, incidence rose as more men underwent screening. But survival rates also improved dramatically, the result of early diagnoses that prompted patients to alter unhealthy behaviors.

Treatment: Heart Disease, Hypertension, and Stroke, Mental Disorders

The model also incorporates continued development of treatment advances where data are available about historical trends. For example, prescription drugs that lower high blood pressure have reduced the probability or onset of heart attack significantly. Hypertension drugs comprise five classes: alpha blockers, beta blockers, calcium channel blockers, ACE inhibitors, and diuretics. Since the introduction of the first hypertension drug in 1952, the number of drugs on the market has increased to fifty-three. In our model, the increasing growth in the number of drugs available, particularly throughout the 1980s, has played a large role in determining disease prevalence. Treatments are also increasingly available for mental disorders.

The impacts of these screening and treatments on baseline and optimistic incidence/prevalence rates are shown in the following tables. The first table covers the six diseases for which we have data available. By 2023, the prostate cancer incidence rate declines considerably in the optimistic scenario, falling from 225.3 in the baseline to 176.9. Colon cancer incidence also falls by 17.7 percent in the optimistic scenario relative to the baseline. Heart disease and hypertension prevalence rates decline by 34.5 percent and 18.8 percent, respectively. The second table depicts projections for the remaining diseases. Here we rely on changes in behavioral risk factors.

Projections of Chronic Disease with Early Screening and Treatment

		New Cases Thousands		Incidence Rate** Per 100,000 population	
Chronic Disease	**Year***	**Baseline**	**Optimistic**	**Baseline**	**Optimistic**
Colon Cancer	2003	147	147	50.4	50.4
	2013	159	144	50.2	45.5
	2023	193	159	56.1	46.2
Prostate Cancer	2003	217	217	151.8	151.8
	2013	305	292	196.0	187.1
	2023	381	299	225.3	176.9

		Cases with Diagnosis Thousands		Prevalence Percent of U.S. population 25 and over	
Chronic Disease	**Year***	**Baseline**	**Optimistic**	**Baseline**	**Optimistic**
Hypertension	2003	46,822	46,822	24.8	24.8
	2013	57,329	53,082	27.5	25.7
	2023	65,134	52,957	29.1	24.2
Heart Disease	2003	23,810	23,810	12.6	12.6
	2013	28,795	24,988	13.8	12.1
	2023	33,599	21,965	14.9	10.4
Stroke	2003	5,406	5,406	2.9	2.9
	2013	6,018	5,573	2.9	2.7
	2023	6,970	5,657	3.2	2.7
Mental Disorders	2003	30,338	30,338	10.4	10.4
	2013	36,774	35,349	11.6	11.2
	2023	46,673	40,910	13.6	11.9

*Selected years for twenty-year projection
** Male population was used for prostate cancer.
Source: Milken Institute

Projections of Chronic Disease without Early Screening and Treatment

Chronic Disease	Year*	New Cases Thousands Baseline	New Cases Thousands Optimistic	Incidence Rate** Per 100,000 population Baseline	Incidence Rate** Per 100,000 population Optimistic
Breast Cancer	2003	200	200	135.5	135.5
	2013	257	251	159.2	155.7
	2023	302	265	172.7	151.4
Lung Cancer	2003	185	185	63.5	63.5
	2013	202	186	63.7	58.6
	2023	247	202	71.9	58.6
Other Cancers	2003	619	619	212.7	212.7
	2013	831	765	262.2	241.3
	2023	1,021	735	296.9	213.7
Chronic Disease	**Year***	**Cases with Diagnosis Thousands Baseline**	**Cases with Diagnosis Thousands Optimistic**	**Prevalence Percent of U.S. population 25 and over Baseline**	**Prevalence Percent of U.S. population 25 and over Optimistic**
Pulmonary Conditions	2003	29,071	29,071	15.4	15.4
	2013	32,887	31,086	15.6	14.8
	2023	38,162	32,799	16.5	14.2
Diabetes	2003	14,559	14,559	7.7	7.7
	2013	18,825	18,341	8.9	8.7
	2023	22,261	19,301	9.6	8.3

*Selected years for twenty-year projection
** Female population was used for breast cancer.
Source: Milken Institute

Simulations Based on the Three Models

Utilizing the three preceding models—two of which include their own baseline and optimistic assumptions—it is now possible to run simulations that enable us to build twenty-year projections for overall baseline and optimistic incidence/prevalence rates. In order to do so, we must go through three simulations. The results appear in the tables in Section B.

The first simulation accounts for changes in *demographic factors*[44] (age and race) only, holding behavioral risk factors at their 2003 values.

The second simulation accounts for *baseline* projections of Model 2 and Model 3, accounting for *behavioral risk factors* plus available screening and treatment options. We apply the percent changes between the results the first and second simulations to the age-driven demographic projections established in Model 1. This will give us final baseline incidence and prevalence projections.

The third simulation is the same as the second but accounts for *optimistic* risk factor projections plus available *optimistic* screening and treatment options. Similarly, optimistic and incidence and prevalence projections are completed by applying the percent changes between the second and third simulations to the final baseline established in the second simulation.

The incidence/prevalence rates must next be converted to PRC projections to reference back to the established MEPS regional data. We will base the projections on the annual incidence/prevalence projections from the preceding baseline and optimistic scenarios. (In the case of cancers, PRC will be greater than incidence because the MEPS PRC totals include prevalence as well as incidence.) These are reasonably good proxies for cancer PRC projections, and because they assume that PRC totals rise at the same rate as incidence, they may understate PRC since individuals will be living longer with the condition.

44. See the table "Pooled Cross-Sectional Models," page 86.

Finally, we project state PRC from the regional MEPS conversions, using state variations from the models. Then the sums of disease-specific state PRC are adjusted with U.S. MEPS control totals for each year.

PRC Projections with Early Screening and Treatment

		PRC (Thousands)		PRC per 100,000 Population**	
Chronic Disease	Year*	Baseline	Optimistic	Baseline	Optimistic
Colon Cancer	2003	339	339	116.6	116.6
	2013	368	333	116.2	105.2
	2023	447	368	129.9	106.9
Prostate Cancer	2003	1,043	1,043	729.0	729.0
	2013	1,466	1,400	941.1	898.6
	2023	1,828	1,436	1081.6	849.3
		PRC (Thousands)		PRC per Capita	
Chronic Disease	Year*	Baseline	Optimistic	Baseline	Optimistic
Hypertension	2003	36,761	36,761	12,642	12,642
	2013	45,011	41,676	14,200	13,148
	2023	51,138	41,578	14,869	12,089
Heart Disease	2003	19,145	19,145	6,584	6,584
	2013	23,153	20,092	7,304	6,339
	2023	27,016	17,661	7,855	5,135
Stroke	2003	2,425	2,425	834	834
	2013	2,700	2,500	852	789
	2023	3,127	2,538	909	738
Mental Disorders	2003	30,338	30,338	10,433	10,433
	2013	36,774	35,349	11,602	11,152
	2023	46,673	40,910	13,571	11,895

*Selected years for twenty-year projection
** Male population was used for prostate cancer.
Source: Milken Institute

PRC Projections without Early Screening and Treatment

		PRC (Thousands)		PRC per 100,000 Population**	
Chronic Disease	Year*	Baseline	Optimistic	Baseline	Optimistic
Breast Cancer	2003	1,140	1,140	772	772
	2013	1,461	1,429	989	886
	2023	1,719	1,508	1,163	862
Lung Cancer	2003	370	370	127	127
	2013	405	372	128	118
	2023	496	404	144	118
Other Cancers	2003	7,689	7,689	2,644	2,644
	2013	10,333	9,720	3,260	3,067
	2023	12,692	10,407	3,690	3,026
		PRC (Thousands)		PRC per Capita	
Chronic Disease	Year*	Baseline	Optimistic	Baseline	Optimistic
Pulmonary Conditions	2003	49,206	49,206	16,922	16,922
	2013	55,667	52,618	17,562	16,600
	2023	64,595	55,517	18,782	16,142
Diabetes	2003	13,729	13,729	4,721	4,721
	2013	17,752	17,296	5,600	5,457
	2023	20,992	18,201	6,104	5,292

*Selected years for twenty-year projection
** Female population was used for breast cancer.
Source: Milken Institute

Projections for Health-Care Cost Growth

Assumptions for Health-Care Cost Growth in the Baseline Scenario

For the baseline scenario, we assume that health-care cost growth will follow projections of the Centers for Medicare and Medicaid Services (CMS).[45] Implicit in the CMS projections are a broad range of complex assumptions about future health-care cost growth, including trends in specific sectors and changes in public and private insurance coverage.[46]

To make disease-specific expenditure projections, we adjust the CMS-projected inflation rates to account for future costs associated with four specific sites of service (again, we use 2003 MEPS data). The four sites of service include (1) outpatient and office-based visits; (2) home health care; (3) prescription drugs; and (4) hospital inpatient visits, including emergency room services.

Assumptions for Health-Care Cost Growth in the Optimistic Scenario

Health-care cost growth for the "optimistic" scenario is 0.5 percentage point lower than that in the baseline projections. This is a plausible reduction in cost growth as there are a number of trends that could have a moderating effect on health-care cost growth.

For example, more widespread breast self-examination or improved diagnostics would catch breast cancer at an earlier stage, when less-aggressive treatments are available, and reduce the growth in expenditures to treat patients. In the case of asthma (included in pulmonary conditions), improper management can lead to frequent hospitalizations and result in higher treatment expenditures. Improved disease management of diabetes can lessen the risk factors for developing cardiovascular disease and other conditions.

Notably, while the baseline scenario assumes some growth of disease management, more widespread adoption of care coordination and disease management could reduce the rate of future growth of health-care costs. If greater advances in these areas are achieved, slower growth in health-care costs and treatment expenditures would be possible. Similarly, efforts to improve adoption of health-care information technology could reduce clinical and administrative components of health-care costs.

45. The CMS projects a "personal health care" price deflator, which is its overall rate of inflation for the private health sector. The CMS does not report medical cost growth by site-of-service". To estimate medical cost growth for our four categories—outpatient and office based visits; home health care; prescription drugs; and hospital inpatient visits, including emergency room services—consistent with the CMS projection of overall medical inflation, we extract historical data and projections for specific health-care price indexes from Global Insight.

46. Christine Borger, Sheila Smith, Christopher Truffer, Sean Keehan, Andrea Sisko, John Poisal, and M. Kent Clemens, "Health Spending Projections Through 2015: Changes on the Horizon," *Health Affairs*, Vol. 25. February 22, 2006, pp.w61–w73.

Expenditures per PRC - U.S. Dollars

Chronic Disease	Baseline 2003	Baseline 2013	Baseline 2023	Optimistic 2003	Optimistic 2013	Optimistic 2023
Cancer	4,541	6,173	8,512	4,541	5,857	7,709
Breast Cancer	4,840	6,669	9,033	4,840	6,353	8,196
Colon Cancer	11,549	16,605	23,484	11,549	15,822	21,319
Lung Cancer	17,088	23,571	31,963	17,088	22,454	29,004
Prostate Cancer	4,100	5,711	7,821	4,100	5,441	7,097
Other Cancers	3,644	5,099	7,014	3,644	4,858	6,366
Pulmonary Conditions	919	1,299	1,814	919	1,238	1,646
Diabetes	1,977	2,750	3,780	1,977	2,620	3,431
Hypertension	885	1,231	1,694	885	1,173	1,538
Heart Disease	3,381	4,841	6,826	3,381	4,612	6,196
Stroke	5,596	8,084	11,500	5,596	7,703	10,440
Mental Disorders	1,509	2,091	2,862	1,509	1,992	2,597

Source: Milken Institute

We calculate total expenditure projections by multiplying PRC by expenditures per PRC outward for twenty years.

Total Expenditure Projections* - US$ Billions

Chronic Disease	Baseline 2003	Baseline 2013	Baseline 2023	Optimistic 2003	Optimistic 2013	Optimistic 2023
Cancer	48.1	86.6	146.3	48.1	77.6	108.9
Breast Cancer	5.5	9.7	15.6	5.5	9.1	12.4
Colon Cancer	3.9	6.1	10.6	3.9	5.3	7.9
Lung Cancer	6.3	9.6	16.1	6.3	8.4	11.9
Prostate Cancer	4.3	8.3	14.2	4.3	7.6	10.1
Other Cancers	28.0	52.8	89.7	28.0	47.3	66.6
Pulmonary Conditions	45.2	72.6	118.2	45.2	65.3	92.0
Diabetes	27.1	48.8	79.7	27.1	45.3	62.6
Hypertension	32.5	55.8	88.1	32.5	49.2	64.9
Heart Disease	64.7	112.3	186.0	64.7	92.8	110.1
Stroke	13.6	22.0	36.6	13.6	19.4	26.9
Mental Disorders	45.8	77.2	135.2	45.8	70.6	107.2
Total	277.0	475.3	790.0	277.0	420.2	572.4

*Total medical expenditure
Source: Milken Institute

B: Avoidable Costs by Disease

This section provides the disease-specific baseline and optimistic projections of PRC and expenditures. The difference between the scenarios will be the avoidable direct costs.

Summary Table – Avoided Costs

The next table below summarizes the differences between the optimistic and baseline projection scenarios in absolute and percentage totals of avoidable direct costs. As shown, more than 40 million cases of chronic conditions could be avoided, resulting in avoided treatment costs of $217.6 billion annually in 2023, a 27.5 percent savings.

2023 Avoidable Cost Projections - Difference Between Baseline and Optimistic Projections

	PRC		Expenditures per PRC		Total Expenditures	
Chronic Disease	**Absolute (Thousands)**	**Percent**	**Absolute ($)**	**Percent**	**Absolute (US$ Billions)**	**Percent**
Cancer	-3,060	-17.8	-803	-9.4	-37	-25.6
Breast Cancer	-211	-12.3	-836	-9.3	-3.2	-20.6
Colon Cancer	-79	-17.7	-2,166	-9.2	-2.7	-25.5
Lung Cancer	-91	-18.4	-2,959	-9.3	-4.2	-26.2
Prostate Cancer	-393	-21.5	-723	-9.2	-4.1	-28.9
Other Cancers	-2,285	-18.0	-649	-9.2	-23.1	-25.8
Pulmonary Conditions	-9,078	-14.1	-167	-9.2	-26.2	-22.2
Diabetes	-2,791	-13.3	-350	-9.2	-17.1	-21.5
Hypertension	-9,561	-18.7	-157	-9.2	-23.3	-26.4
Heart Disease	-9,354	-34.6	-630	-9.2	-75.8	-40.8
Stroke	-589	-18.8	-1,060	-9.2	-9.7	-26.5
Mental Disorders	-5,763	-12.3	-265	-9.3	-28.0	-20.7
Total	-40,196	-17.4	–	–	-217.6	-27.5

Source: Milken Institute

Cumulatively over two decades, the direct avoidable treatment cost totals $1.6 trillion for all chronic diseases in this study.

Avoidable Direct Costs - US$ Billions

	Cumulative Sum 2004-2023		
Chronic Disease	**Baseline**	**Optimistic**	**Avoidable Costs***
Cancer	1,850	1,578	-272.0
Breast Cancer	205	183	-22.3
Lung Cancer	208	176	-32.4
Colon Cancer	134	112	-21.7
Prostate Cancer	178	150	-27.2
Other Cancers	1,126	958	-168.5
Diabetes	1,032	913	-118.5
Heart Disease	2,392	1,830	-561.7
Pulmonary Conditions	1,551	1,352	-199.6
Hypertension	1,172	992	-179.6
Stroke	470	397	-72.7
Mental Disorders	1,679	1,483	-196.6
Total	10,146	8,545	1,600.8

*Sums of Differences between Baseline and Optimistic Projections
Source: Milken Institute

Below, we discuss the avoidable costs for each disease.

BREAST CANCER

Breast cancer is now the second leading cause of death among women, having fallen below lung cancer.[47] The aging population and rising obesity will probably tip recent reductions in breast cancer incidence back to an upward trajectory. Decreased use of hormone replacement therapy will not have a meaningful effect on overall incidence. Diabetes and obesity show the strongest causal relationships.

Breast cancer survival rates are improving with increased screening and self-examination. New treatments have proved effective for both early and advanced breast cancer, and have reduced the need for more invasive surgery.

Age Demographics Only

Baby boomer aging will have a profound influence on breast cancer PRC totals over the next twenty years. Nearly eight of ten breast cancers are diagnosed in women over 50. The ratio of the incidence rate for the 65–74 age group relative to the 0–49 age group is 9.4. This means that a woman between 65 and 74 is 9.4 times more likely to develop breast cancer than a woman under 50.

To project breast cancer PRC figures, we maintain age-specific incidence rates at their 2003 levels and hold all other factors constant. PRC for breast cancer rises 39.5 percent between 2003 and 2023.

Baseline Scenario

After aging, obesity will have the most deleterious effect on breast cancer PRC through 2023. Baseline assumptions call for obesity to increase at a rate slightly below that of the recent past and to plateau after 2015. We apply the obesity behavioral risk factor (captured in the pooled fifty-state model) to the aging population to calculate the extent to which obesity will influence breast cancer PRC. Combined with aging, rising obesity causes the baseline PRC projection to increase by 50.8 percent between 2003 and 2023. This is 11.3 percentage points greater than aging alone. Rising obesity adds 128,404 to the PRC total in 2023, when it reaches 1,719,170.

Unlike prostate, colon and lung cancer treatment, breast cancer treatment relies more on prescription drugs than inpatient care (just 22 percent of expenditures were directed to inpatient hospital care versus 73 percent for colon cancer in 2003). Consistent with health-care cost growth projections, breast cancer expenditures per PRC rise 86.6 percent, an increase of 3.2 percent annually. In dollar amounts, expenditures per PRC grow from $4,840 in 2003 to $9,033 in 2023.

Treatment expenditures jump from $5.5 billion to $15.6 billion, a 182.2 percent increase. Over the next two decades, the health-care system will spend $205 billion on treatment. Reducing obesity will be the most likely way to contain costs and reduce disability and death.

47. American Cancer Society, "Cancer Facts and Figures 2007." Atlanta: American Cancer Society; 2007. p.9.

Optimistic Scenario

The projected path for obesity drops as health initiatives catch on over the coming decades. The obesity rate peaks in 2011 and falls to the rate last experienced in 1998. Breast cancer PRC grows by 32.2 percent—but the total is down by 211,414 PRC, or 12.3 percent.

Expenditures per PRC are based on an assumption of lower growth in medical care costs, increasing 0.5 percentage point slower per year than in the baseline. Thus, expenditures per PRC are 9.3 percent less (or $836 lower) by 2023. Total expenditures increase 124.1 percent between 2003 and 2023, reaching $12.4 billion.

Direct Avoidable Costs

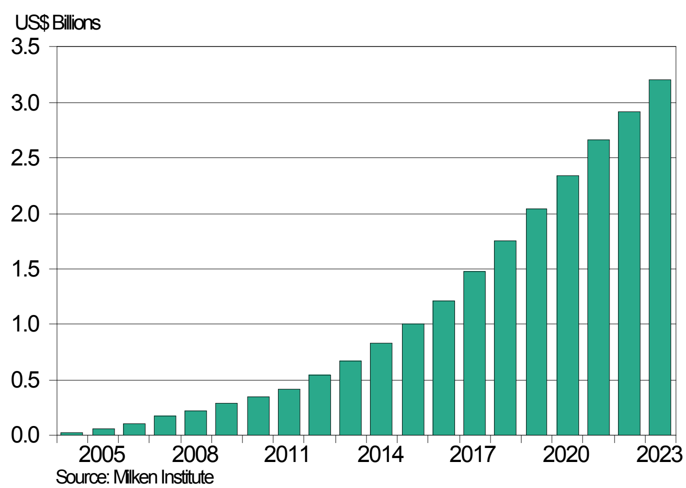
Reduced obesity rates lower future treatment expenditures. The difference between the baseline and optimistic expenditure projections provides an estimate of the direct avoidable costs. In 2023, expenditures are 20.6 percent lower ($3.2 billion lower) in the optimistic scenario. The cumulative difference over the period is $22.3 billion.

Breast Cancer

	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
Year	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	1,140	1,140	1,140	4,840	4,840	5.5	5.5
2023	1,591	1,719	1,508	9,033	8,196	15.6	12.4
Percent Change 2003-2023	39.5	50.8	32.2	86.6	69.3	182.2	124.1

Source: Milken Institute

Breast Cancer - Avoidable Costs



COLON CANCER

The aging population and obesity trends push incidence and PRC higher, but declines in smoking and more widespread screening limit the increase. Smoking, which is typically associated with lung cancer, is a greater risk factor for colon cancer than are obesity and aging. Recent studies show that smokers are 30 percent to 40 percent more likely than nonsmokers to die of colon cancer.

Incidence rates have been declining for nearly two decades, from 66.3 cases per 100,000 population in 1985 to 49.5 in 2003. Deaths have dropped over the past fifteen years, in part because of improved screening.[48]

Age Demographics Only

The aging population will significantly affect incidence rates and PRC during the projection period, leading to a reversal in the downward trend. More than nine out of ten colon cancers are diagnosed in people over 50. The ratio of the incidence rate for the 65–74 age group relative to the 0–49 age group is 36.1. This means that an individual between 65 and 74 is 36.1 times more likely to develop colon cancer than someone under 50. PRC jumps 51.2 percent, based upon aging alone, between 2003 and 2023. Fortunately, other factors will partially offset this escalation.

Baseline Scenario

Among behavioral risk factors, only obesity is expected to have a deleterious impact on future PRC totals. Reductions in smoking and modest gains in exercise rates more than offset rising obesity impacts. At-risk smoking declines by roughly 3 percentage points over the next twenty years. This, with a modest improvement in physical activity, pushes PRC below where age alone would place it. Improved behavioral patterns cut a potential 45,532 cases (8.9 percent) relative to aging demographics. More widespread screening cuts another 22,188 PRC in 2023. PRC increases to 446,752 (a 31.8 percent gain), or 19.4 percentage points below where aging alone would push it.

Colon cancer has the highest inpatient hospital care share (73.0 percent) of total treatment costs. Prescription medications account for only 1.5 percent of treatment costs. Based on projections on medical care cost growth, expenditures per PRC will rise 103.3 percent between 2003 and 2023, an increase of 3.6 percent annually. In dollar amounts, expenditures per PRC rise from $11,549 in 2003 to $23,484.

Total expenditures grow from $3.9 billion in 2003 to $10.6 billion in 2023, an increase of 171.8 percent. The nation will spend $133.9 billion cumulatively over the next twenty years in overall treatment costs. Increased screening, lower smoking rates, changes in diet, improved physical activity, and declines in obesity are likely sources of cost containment and reductions in incidence and death.

Optimistic Scenario

At-risk smoking declines by another 2.7 percentage points. Physical activity improves, and the obesity rate peaks in 2011, then falls to the rate last experienced in 1998. PRC is reduced by 63,927 relative to the baseline by 2023. Improved screening will reduce PRC by another 35,192. The optimistic scenario contains 78,931 fewer

48. American Cancer Society, "Cancer Facts and Figures 2007." Atlanta: American Cancer Society; 2007. p.12.

PRC (down 17.7 percent) in 2023. The incidence rate will fall modestly over the period and edge up beginning in 2020, but remain below current levels. Expenditures per PRC are 9.2 percent lower ($2,166 less). Total treatment expenditures grow 102.5 percent between 2003 and 2023, reaching $7.93 billion.

Direct Avoidable Costs

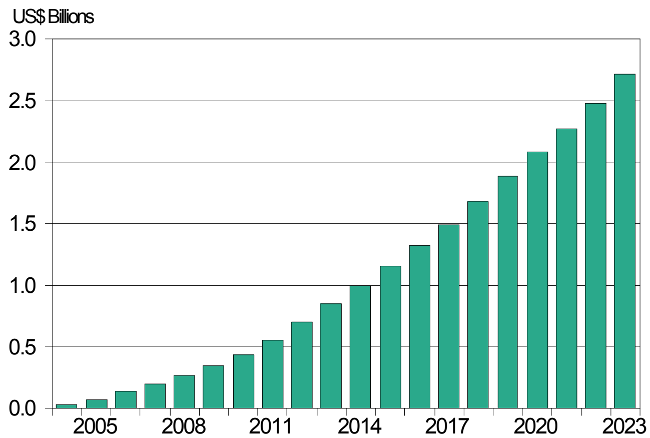
Behavioral changes and improved screening lower future treatment expenditures by an appreciable amount. The difference between the baseline and optimistic expenditure projections provides an approximation of the direct avoidable costs. By 2023, expenditures are 25.5 percent lower ($2.7 billion less) relative to the baseline. The cumulative difference between the two projections over the period is $21.7 billion.

Colon Cancer

	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
Year	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	339	339	339	11,549	11,549	3.9	3.9
2023	512	447	368	23,484	21,319	10.6	7.9
Percent Change 2003-2023	51.2	31.8	8.5	103.3	84.6	171.8	102.5

Source: Milken Institute

Colon Cancer - Avoidable Costs



Source: Milken Institute

LUNG CANCER

Lung cancer has a greater statistical relationship with a single unhealthy behavior—smoking—than does any other cancer and virtually every other chronic disease. Smoking, including exposure to secondhand smoke, causes approximately 90 percent of all cases.

Currently, no approved screening procedure exists that improves survival or detects localized disease. However, studies are under way to find an appropriate screening tool. The one-year survival rate has risen to 42 percent, up from 37 percent in the mid-1970s. The five-year survival rate for localized cases is 49 percent versus 16 percent for all cases—but just 16 percent of lung cancer cases are diagnosed when the disease is localized.[49] Lung cancer kills more people that breast, colon, and prostate cancer combined.

Age Demographics Only

The aging population will affect incidence rates and PRC over the next twenty years. The ratio of the incidence rate for the 65–74 age group relative to the 0–49 age group is 70.8. This means that an individual between 65 and 74 is 70.8 times more likely to develop lung cancer than someone under 50. Holding age-specific incidence rates at their 2003 level, we see lung cancer PRC figures climb 55.8 percent between 2003 and 2023. By 2023, lung cancer PRC will be 206,667 above the 2003 level.

Baseline Scenario

Based upon our calculations, declining smoking rates in 2023 will reduce PRC by 81,000 to below where age alone suggests it would reach. Baseline PRC is projected to increase 33.9 percent, 21.9 percentage points below that solely attributable to age factors. Lung cancer PRC will still increase by 125,667 in 2023, hitting 495,873.

Lung cancer treatment costs are driven by hospital inpatient hospitalization and surgery rates. Prescription medications account for only 1.8 percent of treatment costs. Based on projections of medical-care cost growth, expenditures per PRC grow 87.1 percent between 2003 and 2023, an increase of 3.2 percent annually. Expenditures per PRC rise from $17,088 to $31,963.

Total treatment expenditures rise from $6.3 billion in 2003 to $16.1 billion in 2023, a jump of 154.1 percent. The nation will spend $207.91 billion cumulatively over the next twenty years on treatments. Increased screening and reduction in smoking are the most likely sources of cost containment and reduced incidence.

Optimistic Scenario

The primary difference in PRC projections for this scenario is the lower projected path of smoking. At-risk smoking declines by 2.7 percentage points more in the optimistic scenario. Lung cancer PRC increases by just 9.2 percent, resulting in 18.4 percent fewer PRC than in the baseline. This translates into 91,463 fewer PRC in 2023.

Expenditures per PRC total 9.3 percent less (or $2,959 less) by 2023. Total expenditures grow 87.5 percent between 2003 and 2023, when they reach $11.9 billion.

49. "Cancer Facts and Figures 2007." Atlanta: American Cancer Society; 2007. p.14.

Direct Avoidable Costs

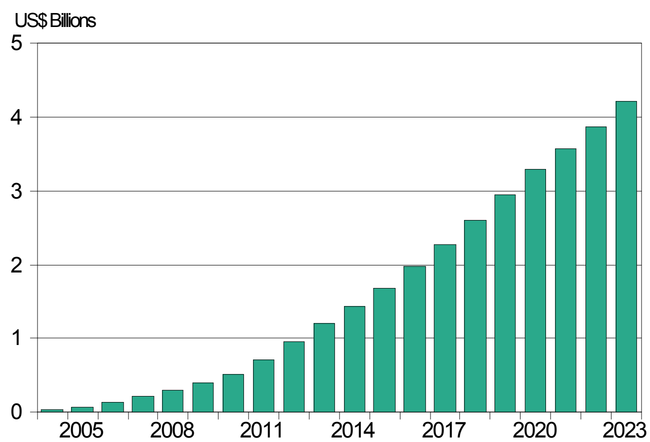
The difference between baseline and optimistic expenditure projections gives an estimate of the avoidable costs. By 2023, expenditures are 26.2 percent less ($4.2 billion lower) in the optimistic scenario than in the baseline. The cumulative difference over the projection interval is $32.4 billion.

Lung Cancer

Year	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	370	370	370	17,088	17,088	6.3	6.3
2023	577	496	404	31,963	29,004	16.1	11.9
Percent Change 2003-2023	55.8	33.9	9.2	87.1	69.7	154.1	87.5

Source: Milken Institute

Lung Cancer - Avoidable Costs



Source: Milken Institute

PROSTATE CANCER

Increased screening has led to earlier detection and improved survival rates, but aging demographics and higher obesity rates will likely push incidence and PRC higher over the next two decades. The exact cause of prostate cancer has not been identified, nor is it possible to prevent all cases, though many may be avoided.[50] Eating less red meat and fat, and more fruits, grains, and vegetables will likely lower the odds of developing prostate cancer, reduce the likelihood of suffering a recurrence, and help slow the progression of the disease.[51]

Due to widespread PSA screening, more than 90 percent of all prostate cancers are discovered in the early stages, where the survival rate is essentially 100 percent. Twenty-five years ago, the survival rate was 69 percent. Recent studies show that the link to high BMI/obesity is stronger than previously thought, an ominous sign for future incidence rates.[52]

Age Demographics Only

The ratio of the incidence rate for the 65–74 age group relative to the 0–49 age group is an astronomical 167.2. This means that a man between 65 and 74 is 167.2 times more likely to develop prostate cancer than a man under 50. When we hold age-specific incidence rates at their 2003 level and all other factors constant, the figures are shocking: prostate cancer PRC soars 62.0 percent between 2003 and 2023. In 2023, prostate cancer PRC is 646,767 higher than it is today.

Baseline Scenario

Obesity could compound the aging impact on PRC. Rising obesity rates add 213,291 more PRC by 2023 than the total projected from age alone. Fortunately, widespread screening will allow men to change unhealthy behaviors, preventing an even greater increase. PRC nonetheless increases by 75.4 percent (785,853) between 2003 and 2023.

Outpatient and office visits account for nearly 50 percent of total treatment costs, second only to breast cancer. Prescription medications represent just 4.5 percent of treatment costs. Based on projections of medical-care cost growth, expenditures per PRC rise 90.8 percent between 2003 and 2023, an increase of 3.3 percent per year. In dollar amounts, expenditures per PRC jump from $4,100 to $7,821.

Total treatment expenditures increase from $4.3 billion in 2003 to $14.2 billion in 2023, a staggering increase of 233.2 percent over twenty years. The country will spend $177.6 billion cumulatively over the next two decades on treatments. Increased screening, changes in diet, improved physical activity, and, most significant, declines in obesity are likely sources of incidence and cost containment.

50. "Cancer Facts and Figures 2007." Atlanta: American Cancer Society; 2007. p.18.
51. Prostate Cancer Foundation. See: http://www.prostatecancerfoundation.org/site/.itlWK2OSG/b.788353/ k.85EB Fruits_and_Vegetables.htm and http://www.prostatecancerfoundation.org/site/c.itlWK2OSG/b.788359/k.6989/Dietary_Fats_and_Red_Meat.htm.
52. Christopher L. Amling, Riffenburgh, Robert H., Sun, Loen, Moul, Judd W., Lance, Raymond S., Kusuda, Leo, Sexton, Wade J., Soderdahl, Douglas W., Donahue, Timothy F., Foley, John P., Chung, Andrew K., and Mcleod, David G., "Pathologic Variables and Recurrence Rates as Related to Obesity and Race in Men With Prostate Cancer Undergoing Radical Prostatectomy." *Journal of Clinical Oncology*. Vol. 22, No. 3, February 1, 2004.

Optimistic Scenario

This scenario is based on the obesity rate peaking in 2011, then falling by 2023 to the rate last experienced in 1998. Physical activity improves relative to the baseline. PRC is cut by 350,528 with improved behavioral changes. More screening cuts an additional 116,412 PRC. We see 392,735 fewer PRC (21.5 percent less) than in the baseline. The incidence rate rises by 16.5 percent, much lower than the 48.4 percent jump in the baseline.

Expenditures per PRC are 9.3 percent below the baseline ($723 lower) in 2023. Total treatment expenditures soar 137.0 percent, hitting $10.1 billion.

Direct Avoidable Costs

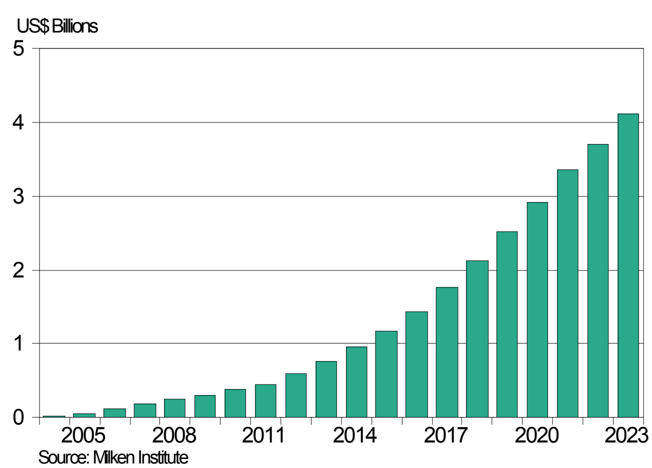
Behavioral changes and increased screening are projected to lower future treatment expenditures significantly. The difference between the baseline and optimistic projections provide an approximation of the direct avoidable costs. By 2023, expenditures are 28.9 percent lower ($4.1 billion lower) relative to the baseline. The cumulative difference over the twenty-year period is $27.2 billion.

Prostate Cancer

Year	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	1,043	1,043	1,043	4,100	4,100	4.3	4.3
2023	1,689	1,828	1,436	7,821	7,097	14.2	10.1
Percent Change 2003-2023	62.0	75.4	37.7	90.8	73.1	233.2	137.0

Source: Milken Institute

Prostate Cancer - Avoidable Costs



OTHER CANCERS

Skin cancer is the most prevalent of the "other cancers." But liver, kidney, brain, bladder, and uterine cancer, in addition to leukemia, are also significant. There is a clear link to aging for these cancers as a group, and a number of behavioral risk factors will affect the projections.

Age Demographics Only

Baby boomers will have an appreciable impact on incidence rates and PRC during the projection period. While not as high as for colon, prostate, and lung cancer, the ratio of the incidence rate among "other cancers" for the 65–74 age group relative to the 0–49 age group is 12.3. This means that an individual between 65 and 74 is more than 12.3 times more likely to develop some form of "other cancers" than someone under 50. Maintaining age-specific incidence rates at their 2003 level and holding all other factors constant, we see that PRC leaps 44.3 percent.

Baseline Scenario

A number of behavioral risk factors are associated with "other cancers" due to their diversity. Obesity is expected to have a detrimental impact on future PRC. So will high cholesterol, but to a lesser extent. Reductions in smoking rates will partially offset rising obesity. The combination of all behavioral risk factors pushes up PRC by 1.6 million (14.4 percent) relative to age alone. PRC increases by 65.1 percent, or 20.8 percentage points above where aging alone would push it. The PRC total jumps to 12,692,038.

Based upon the projections on medical care cost growth, expenditures per PRC increase 92.5 percent between 2003 and 2023, rising 3.2 percent annually. Expenditures per PRC jump from $3,644 to $7,014. Total expenditures increase from $28.0 billion to $89.7 billion in 2023, an increase of 220.2 percent. The country will spend $1,126.06 billion cumulatively over the next twenty years on treatments.

Optimistic Scenario

At-risk smoking declines by 2.7 percentage points more in this scenario. The obesity rate peaks in 2011 and falls to the rate last experienced in 1998. Cholesterol levels decline. PRC is reduced by 2.29 million (or by 18 percent) in the optimistic scenario due to these behavioral changes. The incidence rate will rise until 2012 and begin a modest decline thereafter, but remain above current levels.

Thus, expenditures per PRC run 9.3 percent lower (or $649 less) by 2023. Total treatment expenditures are projected to grow 137.7 percent between 2003 and 2023, reaching $66.6 billion.

Direct Avoidable Costs

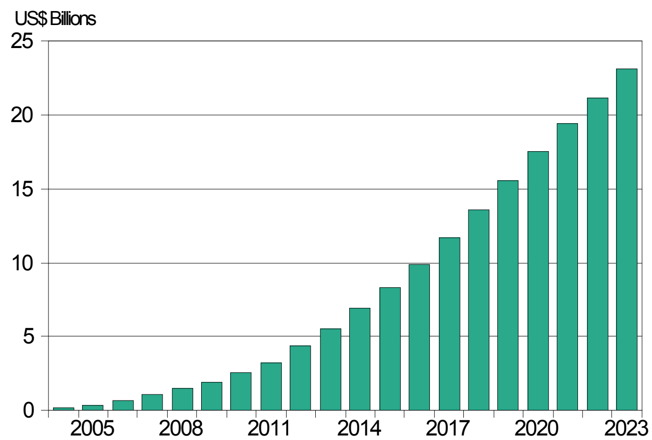
These behavioral changes lower future treatment expenditures by a significant amount. The difference between the baseline and optimistic scenarios for expenditure projections provides an approximation of the avoidable costs. By 2023, expenditures are 25.8 percent less ($23.1 billion less) than in the baseline projection. The cumulative difference between over the projection interval is $168.5 billion.

Other Cancers

Year	PRC (Thousands) Demographics Only	Baseline	Optimistic	Expenditures per PRC ($) Baseline	Optimistic	Total Expenditures (US$ Billions) Baseline	Optimistic
2003	7,689	7,689	7,689	3,644	3,644	28.0	28.0
2023	11,095	12,692	10,407	7,014	6,366	89.7	66.6
Percent Change 2003-2023	44.3	65.1	35.4	92.5	74.7	220.2	137.7

Source: Milken Institute

Other Cancers - Avoidable Costs



Source: Milken Institute

PULMONARY CONDITIONS

An aging population and worsening air quality will likely lead to increased incidence of pulmonary conditions. Lower smoking prevalence, however, will have a countervailing effect.

More than 31.9 million adults suffer from one or more pulmonary conditions, including asthma and chronic obstructive pulmonary disease (COPD). An additional 24.0 million show evidence of impaired lung function, indicating that these chronic diseases are under-diagnosed. There is good news, however. Asthma death rates continue to plateau at an age-adjusted rate of approximately 1.4 per 100,000. (Hospitalizations for asthma attacks declined by 3 percent between 1995 and 2003.) In many cases, pulmonary diseases are preventable. Between 80 percent and 90 percent of COPD (chronic obstructive pulmonary disease) deaths are caused by smoking.[53] Secondhand smoke increases the risk of an asthma attack.

Age Demographics Only

Slightly higher prevalence rates have been associated with aging. For example, pulmonary conditions are found in approximately 12.6 percent of people ages 25–44, compared to 20.7 percent of those 65–74. This relationship is expected to continue. Maintaining age-specific prevalence rates at their 2003 levels and holding all other factors constant, we find that the prevalence rate increases from 16.9 percent in 2003 to 18.2 percent in 2023. The aging of the population alone will increase PRC by 13.4 million by 2023, an increase of 27 percent over 49.2 million.

Baseline Scenario

Pulmonary conditions are more common among Hispanic-Americans than other ethnic/racial groups. Projected growth of this population segment, from 11.3 percent of the population in 2003 to 16.5 percent by 2023, will lead to rising PRC.

Worsening air quality will also contribute to increased disease rates. In the next two decades, the average air quality level is expected to be nearly 50 percent worse that it was in 2003. However, the baseline assumptions call for the number of at-risk smokers to decline to 19 percent of the population, reducing prevalence and offsetting air quality impacts.

Baseline PRC increases by approximately 31.3 percent, only 4.1 percentage points greater that it would by aging alone. We project the PRC to total 64.6 million in 2023.

Compared to other chronic diseases—notably the cancers profiled in this study—treatment of pulmonary conditions is more dependent on prescription drugs. According to MEPS, prescription drugs accounted for approximately 35 percent of health-care expenditures in 2003. In contrast, spending on drugs accounted for only 3.5 percent for cancer treatment outlays. Consistent with the projections on medical care cost growth, expenditures per PRC grow from $919 to $1,814, or by 97.3 percent.

Total treatment expenditures jump from $45.2 billion to $118.2 billion, an increase of 161.3 percent. Over the next twenty years, the nation will spend over $1.5 trillion on pulmonary conditions treatments. Reduced

53. American Lung Association. See: http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=22596 and http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=35020.

smoking and improved air quality are the most likely sources of cost containment and reductions in disability and death.

Optimistic Scenario

The number of at-risk smokers falls to approximately 15.4 percent of the adult population by 2023, compared to the 19.0 percent in the baseline scenario. We project lower air pollution levels. PRC grows by 12.8 percent between 2003 and 2023, resulting in 9.1 million fewer PRC. Notably, prevalence declines from 16.9 percent of the population in 2003 to 16.1 percent in 2023.

Expenditures per PRC increase 79.1 percent between 2003 and 2023, reaching $1.6 trillion. Total treatment expenditures are projected to grow 103.3 percent between 2003 and 2023, reaching $92.0 billion.

Direct Avoidable Costs

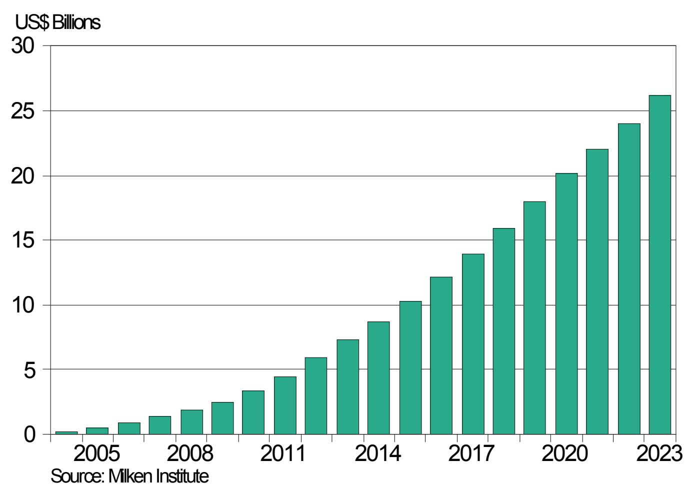
Behavioral changes and improved air quality would lower future treatment expenditures on pulmonary conditions. The difference between the baseline and optimistic expenditure projections provides an estimate of the avoidable costs. By 2023, expenditures are 22.2 percent lower ($26.2 billion less) than in the baseline scenario. The cumulative difference over the projection interval is $199.6 billion.

Pulmonary Conditions

Year	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	49,206	49,206	49,206	919	919	45.2	45.2
2023	62,602	64,595	55,517	1,814	1,646	118.2	92.0
Percent Change 2003-2023	27.2	31.3	12.8	97.3	79.1	161.3	103.3

Source: Milken Institute

Pulmonary Conditions - Avoidable Costs



DIABETES

Rising obesity threatens to send diabetes and associated diseases and conditions (hypertension, heart disease, stroke, adult blindness, non-traumatic amputations) soaring over the next twenty years. Treatment rates will skyrocket too.

Prediabetes is a related chronic condition that increases the risk of developing type 2 diabetes—the diabetes most closely linked to obesity. Patients with prediabetes have blood glucose levels higher than normal, but not high enough to be diagnosed with diabetes under current diagnostic guidelines. The CDC estimates that 41 million Americans ages 40–74 suffered from prediabetes in 2000, a figure that grew to 54 million in 2002.[54] Yet the progression from prediabetes to type 2 diabetes is not inevitable. Weight loss, diet, and exercise can prevent or delay its onset. However, the size of the current prediabetes population gives an indication of the potential looming crisis.

Age Demographics Only

The aging of the U.S. population alone will cause diabetes PRC to rise precipitously over the next twenty years. While the prevalence rates don't progress as rapidly with age for diabetes as it does for cancer and stroke, there is nonetheless a dramatic increase. For example, the ratio of 65–74 age group prevalence relative to the 25–44 age group is 7.9 for diabetes versus 6.1 for heart disease. This means that an individual between 65 and 74 is 7.9 times more likely to develop diabetes than someone under 50. The aging population, holding other factors constant, will cause PRC to increase by 40.7 percent between 2003 and 2023.

Baseline Scenario

The rate of increase will moderate and begin to plateau around 2015. By overlaying the obesity risk factor on the aging factor, we find PRC increasing 52.9 percent from 2003 to 2023, or 12.2 percentage points more than that solely attributable to the aging. Rising obesity translates into an additional 1.6 million PRC in 2023, when it hits 20,992,423. PRC would be much higher if obesity rates increase at the trend established over the past two decades.

Diabetes ranks second only to pulmonary conditions for share of prescription drug costs (44 percent) in total treatment costs. Most diabetes cases don't require hospitalization. Consistent with the projections on medical-care cost growth, expenditures per PRC rise 91.2 percent, an increase of 3.3 percent per year. Expenditures per PRC grow from $1,977 in 2003 to $3,780 in 2023.

Total expenditures swell from $27.1 billion in 2003 to $79.7 billion in 2023, an increase of 193.7 percent. Without changes in diet, physical activity, and therapeutic compounds to obviate weight gains, the health-care system may not be able to absorb these costs. Cumulatively between 2003 and 2023, baseline projections call for $1.0 trillion in treatment costs.

54. Centers for Disease Control and Prevention. National Diabetes Fact Sheet. 2005. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2005.pdf

Optimistic Scenario

This scenario assumes lower obesity rates due to aggressive "healthy body weight" initiatives. The obesity rate peaks in 2011, then falls by 2023 to the rate last experienced in 1998. PRC rises by 32.6 percent, resulting in 13.3 percent fewer (2.8 million fewer) PRC relative to the baseline.

Expenditures per PRC for diabetes are 9.3 percent lower ($350 less) than the baseline by 2023. Total expenditures increase 130.6 percent between 2003 and 2023, reaching $62.6 billion.

Direct Avoidable Costs

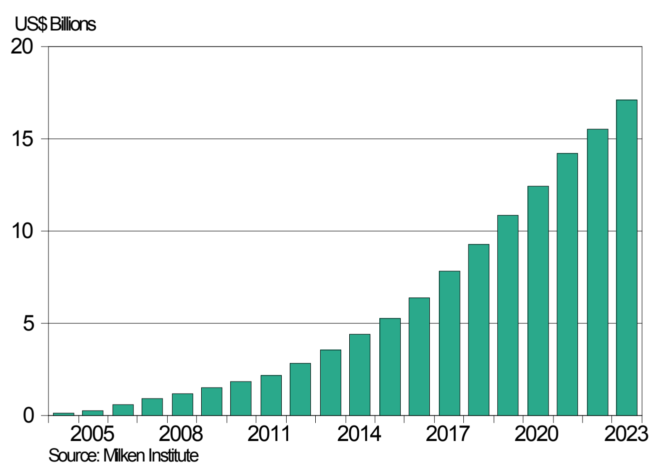
The difference between the baseline and optimistic diabetes expenditure projections gives us an estimate of the avoidable costs. By 2023, expenditures are 21.5 percent lower ($17.1 billion less) in the optimistic scenario. The cumulative difference between the optimistic and baseline scenarios over the projection period is $118.5 billion.

Diabetes

Year	PRC (Thousands) Demographics Only	PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditures per PRC ($) Baseline	Expenditures per PRC ($) Optimistic	Total Expenditures (US$ Billions) Baseline	Total Expenditures (US$ Billions) Optimistic
2003	13,729	13,729	13,729	1,977	1,977	27.1	27.1
2023	19,314	20,992	18,201	3,780	3,431	79.7	62.6
Percent Change 2003-2023	40.7	52.9	32.6	91.2	73.5	193.7	130.6

Source: Milken Institute

Diabetes - Avoidable Costs



HYPERTENSION

While hypertension (high blood pressure) has some debilitating symptoms, the prime risks to patients and health-care costs are tied to comorbidities with heart disease and stroke. High blood pressure is preventable but also very common; approximately one in three adults develops the disease. Even more troubling, about 30 percent of all cases are undiagnosed.[55] Furthermore, 11 percent of those diagnosed are not on therapy, and 25 percent are on inadequate therapy, leading to increased risk of heart disease or stroke. Here, too, obesity and high BMI are causal factors in prevalence.

More than 40 percent of Americans have high blood pressure. The disease killed approximately 49,707 Americans in 2002 and was listed as the primary or contributing cause in about 261,000 deaths in 2002.[56]

Hypertension is controllable through lifestyle and dietary changes. These include weight control, exercise, proper nutrition, and limiting alcohol consumption. Current drug treatments include angiotension-converting enzyme inhibitors, angiotensin receptor blockers (ARBs), diuretics, beta-blocker, alpha-blockers, alpha-beta-blockers, calcium channel blockers, nervous system inhibitors, and vasodilators. Combination drug therapies are often used.[57]

Age Demographics Only

The ratio of the prevalence rate for hypertension for the 65–74 age group relative to the 25–44 age group is 5.5. This means that an individual between 65 and 74 is 5.5 times more likely to develop hypertension than someone under 50. The aging population will affect the overall prevalence rate. Based solely upon the aging population, hypertension PRC jumps 38.2 percent between 2003 and 2023.

Baseline Scenario

Moderate increases in exercise rates will largely counteract rising obesity. Nonetheless, the net impact of behavioral risks push hypertension PRC to an additional 2,118,861 (4.2 percent) relative to aging demographics alone. More widespread use of existing medications and FDA approval of new ones to delay or eliminate the onset of the disease cut PRC by 1,788,337 in 2023. PRC increases by 39.1 percent between 2003 and 2023, just higher than where aging alone would push it. Total hypertension PRC reaches 51,138,353.

Of total treatment costs, hypertension has the highest prescription drug share, at 53.5 percent, and the lowest inpatient hospital care, at 14.0 percent. Based on projections of medical-care cost growth, expenditures per PRC rise 91.5 percent between 2003 and 2023, an increase of 3.3 percent annually. Expenditures per PRC grow from $885 in 2003 to $1,694 in 2023. Total treatment expenditures rise from $32.5 billion in 2003 to $88.2 billion in 2023, a 171.0 percent escalation. The nation will pay $1.2 trillion cumulatively over the next twenty years in treatments.

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55. Centers for Disease Control and Prevention. See: http://www.cdc.gov/bloodpressure/facts.htm and American Heart Association. See: http://www.americanheart.org/presenter.jhtml?identifier=212.
56. http://www.americanheart.org/downloadable/heart/1110821765203FS14HBP5.REVdoc. See also: http://www.cdc.gov/dhdsp/library/fs_bloodpressure.htm.
57. Centers for Disease Control and Prevention. See: http://www.cdc.gov/bloodpressure/about.htm and WebMD: http://www.webmd.com/hypertension-high-blood-pressure/guide/hypertension-treatment-overview.

Optimistic Scenario

Changes in obesity and exercise levels prevent the rapid progression of prevalence. Hypertension PRC is cut by 8,822,657 (a 16.7 percent reduction) in this scenario. Prescription drug innovations reduce PRC by 2,526,382 (5.7 percent) in 2023. We project 9,560,602 fewer PRC (18.7 percent) than in the baseline. The prevalence rate peaks in 2010 and declines moderately thereafter.

Expenditures per PRC are 9.3 percent lower ($157 less) than in the baseline by 2023. Total treatment expenditures increase 99.4 percent between 2003 and 2023, when they hit $64.9 billion.

Direct Avoidable Costs

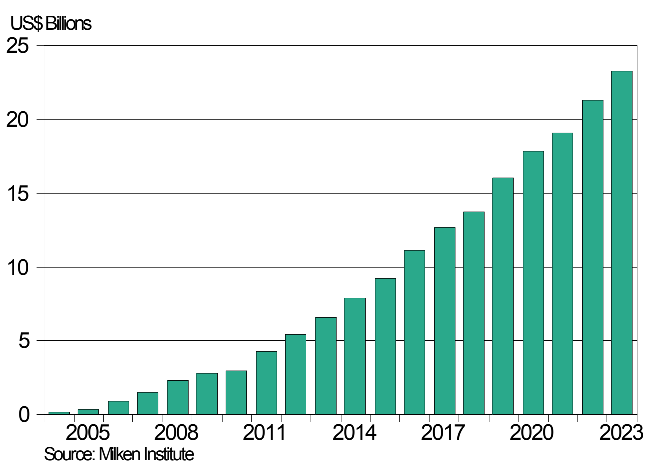
The behavioral changes evaluated in the optimistic scenario would reduce future hypertension treatment expenditures appreciably. The difference between the baseline and optimistic expenditure projections provides an approximation of the avoidable costs. By 2023, expenditures are 26.4 percent ($23.30 billion) below the baseline. The cumulative difference between the optimistic and baseline over the projection interval is $179.6 billion.

Hypertension

Year	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	36,761	36,761	36,761	885	885	32.5	32.5
2023	50,808	51,138	41,578	1,694	1,538	88.2	64.9
Percent Change 2003-2023	38.2	39.1	13.1	91.5	73.8	171.0	99.4

Source: Milken Institute

Hypertension - Avoidable Costs



HEART DISEASE

Death rates from most types of heart disease have declined over the past 30 years. Heart disease prevalence rates, however, have moderated by substantially less. Despite significant treatment advances through prescription medications, angioplasty, and stent insertion, heart disease remains the leading cause of death in the United States. Coronary heart disease is the principal form of heart disease, accounting for 71 percent of all heart disease deaths.[58]

Reduced smoking rates contributed to the decline in prevalence from 1980 through 1999. But other behavioral factors appear likely to offset the decrease. More recent studies show much stronger statistical links to obesity and high BMI. Our own econometric analysis supports this finding. Combined with the aging of the population, obesity is likely to cause an increase in heart disease PRC in the absence of significant behavioral changes.

Age Demographics Only

Aging demographics won't have as strong an influence on heart disease as on cancers, but they will have a discernable effect on prevalence and PRC during the projection period. The ratio of the prevalence rate for the 65–74 cohort relative to the 25–44 cohort is 6.1. This means that an individual between 65 and 74 is 6.1 times more likely to develop heart disease than someone under 50. Holding age-specific prevalence rates at their 2003 level and all other factors constant, we see heart disease PRC surge 40.7 percent between 2003 and 2023.

Baseline Scenario

Obesity is the only major behavioral risk factor expected to have a detrimental impact on future PRC. Falling smoking rates and modest gains in exercise will partially compensate for rising obesity. At-risk smoking declines by roughly 3 percentage points over the next twenty years. The net result pushes PRC above where demographics alone would place it by 2023. Behavioral risk factors add 800,917 (3.0 percent) to heart disease PRC relative to aging demographics.

More widespread use of existing medications and FDA approval of new ones to delay or eliminate the onset of the disease cut PRC by 724,347 in 2023. Still, PRC increases by 41.1 percent, slightly above where aging by itself would place it. Heart disease PRC reaches 27,015,705 in 2023.

The inpatient hospital share of total treatment costs for heart disease is 64.2 percent. Prescription medication accounts for 10.8 percent of treatment costs. Based on projections on medical-care cost growth, heart disease expenditures-per-PRC rise 101.9 percent between 2003 and 2023, an increase of 3.6 percent annually. Expenditures per PRC rise from $3,381 in 2003 to $6,826 in 2023.

Total treatment expenditures expand from $64.7 billion in 2003 to $186.0 billion in 2023, a 187.3 percent increase. The nation will spend $2.4 trillion cumulatively over the next twenty years. This is the highest projected expenditure of any disease and will place enormous financial burdens on Medicare and Medicaid. It will force changes in both systems.

58. Centers for Disease Control and Prevention. See: http://www.cdc.gov/HeartDisease/facts.htm.

Optimistic Scenario

Fortunately, changes in behavioral risk factors could significantly alter the future path of heart disease. In the optimistic scenario, at-risk smoking declines by 2.7 percentage points more than in the baseline. Physical activity improves as well. And the obesity rate peaks in 2011, then falls to the rate last experienced in 1998. Heart disease PRC drops by 8,287,913 (or 29.9 percent) due to these behavioral changes alone. Improved prescription medications will eliminate an additional 1,790,665 PRC (9.1 percent) by 2023. The total PRC figure is lower by 9,354,231 (34.6 percent) than in the baseline. In this scenario, prevalence rates fall; in the baseline scenario, they still increase steadily.

Expenditures per PRC are 9.3 percent lower ($649 lower) than in the baseline by 2023. Total treatment expenditures grow 70.1 percent between 2003 and 2023, reaching $110.1 billion.

Direct Avoidable Costs

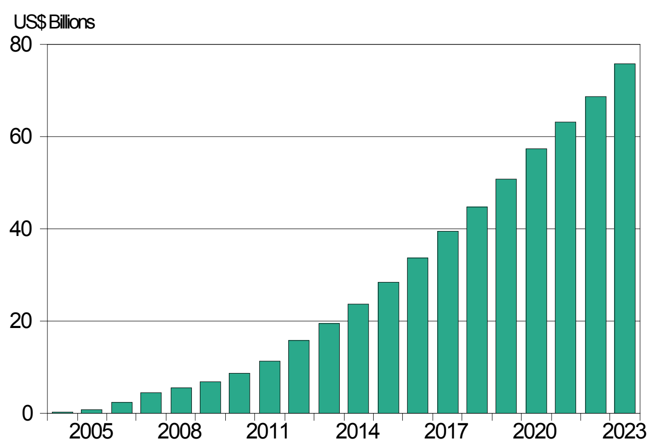
These behavioral changes and improved medications would lower future heart disease treatment expenditures by a significant amount. The difference between the baseline and optimistic heart disease expenditure projections provides an approximation of the avoidable costs. By 2023, expenditures are 40.8 percent lower ($75.9 billion lower) relative to the baseline. The cumulative gap between the optimistic and baseline over the projection interval is a staggering $561.7 billion.

Heart Disease

Year	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	19,145	19,145	19,145	3,381	3,381	64.7	64.7
2023	26,939	27,016	17,661	6,826	6,196	186.0	110.1
Percent Change 2003-2023	40.7	41.1	-7.7	101.9	83.3	187.3	70.1

Source: Milken Institute

Heart Disease - Avoidable Costs



Source: Milken Institute

STROKE

Stroke is among the most debilitating chronic conditions; common symptoms include weakness or paralysis, and diminished cognitive and communication skills. In 2003 there were approximately 700,000 new and recurrent stroke attacks. Approximately 157,800 people died from strokes that year. Prevalence was 2.6 percent of the adult population.[59] Recurrence is frequent—about 25 percent of people who recover from a first stroke will have another stroke within five years.[60]

Comorbidities, such as high blood pressure (hypertension), heart disease, or diabetes, increase the risk for stroke. High blood pressure is the most common cause of stroke: it increases the risk by four to six times.[61] Strokes may not be altogether preventable; however, a number of behavioral changes can reduce the risk of having a first stroke or a recurrence.

Age Demographics Only

The aging population will have a major influence on stroke prevalence. The ratio of the prevalence rate for stroke for the 65-74 age group relative to the 25-44 age group is 14.2. Holding age-specific prevalence rates at their 2003 level over the forecast period causes PRC to surge 47.3 percent based upon the aging of the population between 2003 and 2023.

Baseline Scenario

According to our econometrics, smoking has the strongest causal impact on stroke among behavioral risk factors, a relationship almost as strong as its link with lung cancer. Obesity seems to be more closely tied to stroke than previously believed, but the relationship is somewhat weak. Diminished smoking rates and moderate improvements in exercise partially offset rising obesity in the baseline scenario. As a result, PRC totals are cut 7.2 percent relative to aging demographics alone in 2023. More widespread use of existing medications and FDA approval of new ones to delay or eliminate the onset of the disease cut PRC by 180,598. Between 2003 and 2023, total stroke PRC increases by 28.9 percent, to 3,127,035. These estimates do not include the institutionalized population in nursing homes, prison, or under other supervised care.

Stroke has the highest inpatient hospital care share (76.7 percent) of treatment costs examined in this study. Prescription medications account for 5.4 percent of treatment costs. Based upon the projections on medical-care cost growth, expenditures per PRC rise 105.5 percent between 2003 and 2023, an increase of 3.7 percent per year. In dollar amounts, expenditures per PRC rise from $5,596 to $11,500. Total treatment expenditures increase from $13.6 billion in 2003 to $36.6 billion in 2023, a gain of 169.4 percent. Spending will hit $469.77 billion cumulatively over the next twenty years.

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59. Thom Thomas et al. "Heart Disease and Stroke Statistics. 2006 Update: A Report From the American Heart Association Statistics Committee and Stroke Statistics Subcommittee." Circulation, Vol. 113, No. 6, February 14, 2006. p.e85–e151. Published online before print, January 11, 2006. See: http://circ.ahajournals.org/cgi/reprint/113/6/e85.
60. National Institute of Neurological Disorders and Stroke See: http://www.ninds.nih.gov/disorders/ stroke/stroke.htm.
61. National Stroke Association. See: http://www.stroke.org/site/DocServer/ReducingRiskfactsheet1.doc ?docID=403 and http://www.stroke.org/site/PageServer?pagename=CONT), and American Stroke Association. http://www.stroke association.org/presenter.jhtml?identifier=4716).

Optimistic Scenario

Lower smoking and changes in obesity and exercise levels could prevent many strokes. In this scenario, PRC is cut by 521,463 (15.8 percent) due to these behavioral changes. Prescription drug innovations reduce PRC by 248,375 (8.9 percent) in 2023. Total stroke PRC is 589,240 less (18.8 percent lower) in 2023 than in the baseline. The prevalence rate slowly declines over the projection period.

Expenditures per PRC are 9.2 percent lower ($1,060 lower) lower than in the baseline. Total treatment expenditures increase 97.9 percent between 2003 and 2023, when they reach $26.9 billion.

Direct Avoidable Costs

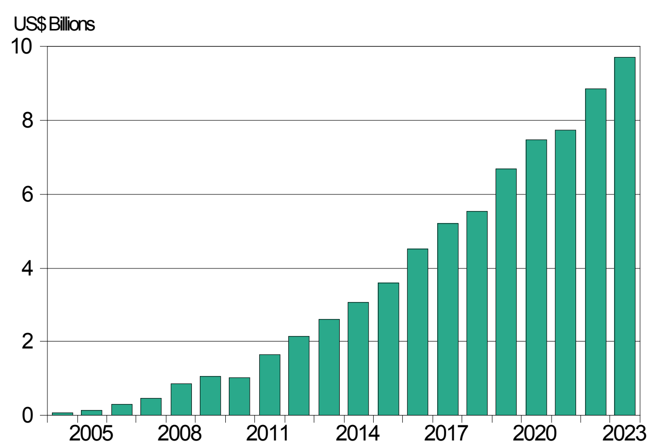
Behavioral changes reduce projected stroke treatment expenditures appreciably. The difference between the baseline and optimistic stroke expenditure projections provides an estimate of the avoidable costs. By 2023, expenditures are 26.6 percent ($9.7 billion) below the baseline. The cumulative difference between the optimistic and baseline over the projection interval is $72.7 billion.

Stroke

	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
Year	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	2,425	2,425	2,425	5,596	5,596	13.6	13.6
2023	3,565	3,127	2,538	11,500	10,440	36.6	26.9
Percent Change 2003-2023	47.0	28.9	4.6	105.5	86.6	169.4	97.9

Source: Milken Institute

Stroke - Avoidable Costs



Source: Milken Institute

MENTAL DISORDERS

In a given year, approximately 26.2 percent of Americans over age 18 suffer from one or more mental conditions, including major depression, mild depression, bipolar disorder, or various anxiety disorders, such as panic, obsessive-compulsive disorder, and phobias. Even though mental disorders are widespread, only 6 percent, or one person in 17, suffer from serious mental illness. All these diseases are a significant source of disability annually.[62]

Treatment costs consist primarily of prescription medications and, to a lesser extent, professional services. In 2003, professional services (principally, physicians and therapists) accounted for only 27 percent of spending on mental disorders. Prescription drugs accounted for approximately 40 percent. Clearly, therapeutic drugs play a crucial role it treating these diseases, and new medications are expected to have a profound impact on treatment costs.

Age Demographics Only

Mental disorders do not appear to be diseases of the aging process. For example, the median age at onset for major depression is thirty-two, while the median age at onset of bipolar disorder is twenty-five. However, from onset, these diseases tend to affect patients for long periods, in many instances for the rest of their lives. Thus, aging trends will affect prevalence rates and PRC. We hold age-specific prevalence rates at their 2003 levels and find that prevalence increases from 10.4 percent of the adult population in 2003 to 13.9 percent in 2023. The aging of the population alone will increase PRC by 17.5 million, an increase of 57.7 percent over PRC of 30.3 million in 2003.

Baseline Scenario

Excessive alcohol consumption, as measured by adults "at risk" of consuming more than two drinks per day, is expected to remain unchanged at the 2003 level of 5.8 percent of the adult population. Other behavioral factors, such as illicit drug use and stress, are expected to contribute to rising prevalence. By 2023, prevalence will be found in approximately 14.3 percent of the adult population. By then, PRC will total roughly 46.7 million, or 53.8 percent more than in 2003.

Based upon the projections on medical care cost growth, expenditures per PRC increase from $1,509 in 2003 to $2,862 in 2023, or by approximately 89.7 percent. Surprisingly, treatment costs exhibit the third-highest growth rate among the chronic diseases in this study, after prostate cancer treatment spending (90.8 percent) and "other cancers" (92.5 percent). Total treatment expenditures grow from $45.8 billion to $135.2 billion, an increase of 195.3 percent. The nation will spend roughly $1.5 trillion cumulatively over the next twenty years in treatment costs.

Optimistic Scenario

While the origins of most mental disorders are complex and may have a hereditary or environmental component, behavioral factors can also affect the prevalence and severity of these conditions. The proportion of the population "at risk" of excessive alcohol consumption no longer remains constant but declines by 1.6 percentage points by 2023. This behavioral change lowers PRC prevalence by approximately 5.8 million.

Even so, the prevalence rate will rise throughout the projection period, reaching 11.9 percent of the population

62. http://www.nimh.nih.gov/healthinformation/statisticsmenu.cfm.

by 2023. This prevalence rate is a full percentage point lower than that of the baseline scenario. Expenditures per PRC run 9.2 percent lower ($265 less) than in the baseline by 2023. Total treatment expenditures grow 134.1 percent between 2003 and 2023, reaching $107.2 billion.

Direct Avoidable Costs

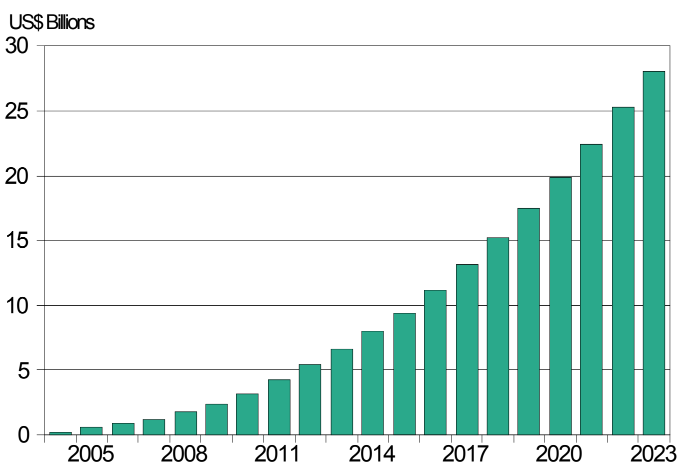
Behavioral changes lower future treatment expenditures by an appreciable amount. The difference between the baseline and optimistic expenditure projections gives us an estimate of the avoidable costs. By 2023, expenditures are 20.9 percent lower ($28.0 billion less) than in the baseline. The cumulative difference over the projection interval is $196.6 billion. Only heart disease (at a staggering $561.7 billion) and hypertension ($179.6 million) show higher direct avoidable costs.

Mental Disorders

Year	PRC (Thousands)			Expenditures per PRC ($)		Total Expenditures (US$ Billions)	
	Demographics Only	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	30,338	30,338	30,338	1,509	1,509	45.8	45.8
2023	47,850	46,673	40,910	2,862	2,597	135.2	107.2
Percent Change 2003-2023	57.7	53.8	34.8	89.7	72.1	195.3	134.1

Source: Milken Institute

Mental Disorders - Avoidable Costs



Source: Milken Institute

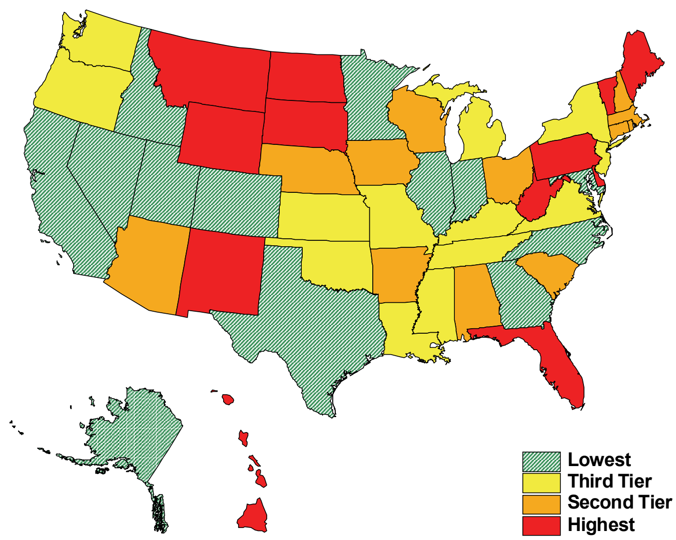
C. State-Level Findings

The methodology for calculating disease-specific expenditure projections at the state level mirrors that established for obtaining state-level PRC figures and treatment expenditures in the "Historical Direct Costs" section. Projecting the MEPS-based data over the twenty-year period, from 2003 to 2023, allows us to examine the consequences of those trends and the future impacts across states.

State-Level Risk Factors

Demographic and behavioral shifts will affect the overall health of state populations, and states showing vulnerability to significant risk factors—high rates of smoking, obesity, cholesterol, and particulate pollution—maintain these factors over the course of the projection period. In most cases, states retain their PRC rankings as well. However, specific data trends, especially those driven by an aging population demographic, play a clear role in the projections.

Percentage of Population Age 65 and Over - By State, 2023



States with a greater share of aging populations will see increased prevalence of diseases to which the older individuals are vulnerable. Wyoming, Maine, and New Mexico show the clear effects of a concentrated aging demographic in their higher rankings for almost every disease.

Regional Cost Variations

Regional variations in treatment costs, insurance, and other trends present in the historical data through 2003 are preserved and extended in the cost projections through 2023. Alaska and Delaware place in the top five states for expenditures per capita for most diseases, even though particular disease prevalence rates may rank near the national average.

State Health Expenditures - Percentage of National Average, 2003

Top Five States	Percent	Bottom Five States	Percent
Alaska	135.8	New Hampshire	84.9
Delaware	122.4	Utah	86.2
North Dakota	114.8	Idaho	87.0
Minnesota	112.7	New Mexico	87.8
Massachusetts	110.8	Arizona	89.3

Sources: Centers for Medicare & Medicaid Services (CMS), Milken Institute

State Trends, by Disease

In this section we compare 2023 projections of PRC and direct costs with historical 2003 totals.

BREAST CANCER

Trends in the data continue to show the highest concentrations of breast cancer in New England, while the lowest incidence rates remain in Western states. Aging demographics play a key role in shifts among state rankings, and the overall aging of the population shows an increase in PRC for every state, in both the optimistic and baseline scenarios.

Among states with the highest incidence rates (PRC share of female population), Vermont moves from 4th in historic trends to 1st in projected trends. Maine moves from 7th to 3rd among the top five, and Rhode Island, which ranked 5th in 2003, falls to 9th place. In the bottom five, aging demographics cause huge shifts in Wyoming and New Mexico rankings, which move out of the bottom five: Wyoming moves from 50th to 28th, and New Mexico from 49th to 37th. The second table shows that Vermont, Alaska, and Maine are projected to have the highest treatment expenditures per capita.

Projected Breast Cancer PRC - Percentage of Female Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Vermont	1.474	1.293	Arizona	0.747	0.656
New Hampshire	1.416	1.242	Utah	0.755	0.662
Maine	1.328	1.165	Nevada	0.816	0.716
Connecticut	1.250	1.096	Idaho	0.864	0.758
Massachusetts	1.214	1.064	Oregon	0.866	0.759

Source: Milken Institute

Projected Expenditure for Breast Cancer - Per Female Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Vermont	174.9	135.3	Utah	57.9	45.1
Alaska	165.0	127.5	New Mexico	58.5	46.4
Maine	154.0	119.9	Arizona	64.0	50.2
New Hampshire	139.4	109.8	California	67.7	54.8
Massachusetts	137.8	110.1	Hawaii	67.9	55.0

Source: Milken Institute

COLON CANCER

Colon cancer rates remain heavily dependent upon secondary risk factors, such as diet and smoking. When combined with an aging demographic, data trends suggest that the distribution of colon cancer rates will continue to affect states in a pattern very similar to the one presented by the 2003 data. All states show an increase in their relative PRC shares of population under the baseline projection, but only three states, Wyoming, Alaska, and New Mexico, show increases under the optimistic projection.

In both the baseline and optimistic scenarios, Alaska shows the largest increase in PRC share of population, rising from 8th in the 2003 baseline and optimistic to 2nd in 2023 PRC share in both scenarios. By per capita expenditures in the second table, Alaska and Wyoming rank highest.

Projected Colon Cancer PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Wyoming	0.202	0.167	Kansas	0.098	0.081
Alaska	0.178	0.147	Minnesota	0.102	0.084
West Virginia	0.169	0.139	Wisconsin	0.104	0.085
Louisiana	0.166	0.137	Missouri	0.104	0.086
Hawaii	0.161	0.133	Michigan	0.105	0.086

Source: Milken Institute

Projected Expenditure for Colon Cancer - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Alaska	73.2	53.2	Michigan	21.6	16.3
Wyoming	53.2	38.9	Kansas	22.3	16.6
Delaware	46.9	34.3	Connecticut	24.7	18.8
Kentucky	45.5	33.5	Illinois	25.3	19.1
Nevada	45.0	32.1	New Jersey	25.6	19.3

Source: Milken Institute

LUNG CANCER

The damage caused by high smoking rates means that the same five states hold the top PRC shares of population in both the 2003 and 2023 data. Under the 2023 baseline projection, lung cancer rates increase for all fifty states, with Alaska showing the largest single state increase, from 20th to 9th.

Under the optimistic scenario, every state except Alaska shows a decline in lung cancer PRC share compared to 2003, albeit not large ones. As the second table illustrates, the four states with the highest per capita lung cancer expenditures in both projected scenarios are Alaska, Nevada, Kentucky, and Delaware. Once again, both Alaska and Delaware see their expenditure rates pushed up by the states' higher overall costs of medical care.

Projected Lung Cancer PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Kentucky	0.207	0.169	Utah	0.072	0.059
Nevada	0.199	0.162	North Dakota	0.102	0.083
Wyoming	0.195	0.159	Minnesota	0.102	0.083
Tennessee	0.184	0.150	Nebraska	0.105	0.086
West Virginia	0.182	0.149	Kansas	0.106	0.087

Source: Milken Institute

Projected Expenditure for Lung Cancer - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Alaska	86.6	62.3	Utah	20.1	14.6
Nevada	79.8	56.3	New Mexico	31.2	23.0
Kentucky	77.9	56.7	Michigan	32.1	24.0
Delaware	67.8	49.1	Kansas	32.4	23.9
Maine	67.8	49.1	Iowa	33.4	24.6

Source: Milken Institute

PROSTATE CANCER

Prostate cancer continues to remain heavily influenced by dietary factors and demographics throughout the projections.

Mississippi retains its 1st place ranking from the 2003 totals and holds its position as the state with the highest PRC share of male population in both the baseline and optimistic 2023 projections. In all states, the overall aging of the population increases PRC share. In 2023, Delaware remains in the top five. Maryland, which ranked 6th in 2003, falls to 12th.

Meanwhile, Oregon has moved from 45th into the bottom five. New Mexico, whose rapidly aging population moves from 47th up to 42rd. Regional cost variations and trends have South Dakota, Minnesota, and Alaska leading in per capita expenditures in 2023, per the second table.

Prostate Cancer PRC - Percentage of Male Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Mississippi	1.613	1.267	Arizona	0.619	0.486
Arkansas	1.492	1.171	Hawaii	0.669	0.526
New Jersey	1.447	1.136	Missouri	0.822	0.646
Louisiana	1.416	1.112	Indiana	0.852	0.669
Delaware	1.407	1.105	Oregon	0.881	0.692

Source: Milken Institute

Projected Expenditure for Prostate Cancer - Per Male Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
South Dakota	144.5	101.2	Arizona	44.5	31.2
Minnesota	138.8	97.6	Hawaii	44.9	32.5
Alaska	135.0	93.5	New Mexico	55.2	39.2
Vermont	134.5	93.2	California	59.8	43.3
Maine	133.1	92.8	Oklahoma	67.9	48.2

Source: Milken Institute

OTHER CANCERS

PRC share for "other cancers" show an increase for all states under both the 2023 baseline and optimistic scenarios. Lifestyle and demographic factors again play a large role, with relatively limited changes occurring in state rankings between the 2003 data and the 2023 projections.

Among states with the highest PRC shares, Maryland manages to fall from 5th under the 2003 data to 9th. West Virginia ranks 5th, up from 7th in 2003. Alaska sees the highest proportionate rise in PRC share, from 2.27 percent to 3.57 percent, and a ranking change from 46th all the way up to 31st. Both Alaska and Colorado fall out of the bottom five states. Hawaii and Kansas are now in the bottom five. From an expenditure standpoint, Delaware, South Dakota, and Alaska are the top three states, despite being ranked 7th, 22nd, and 31st by PRC. Tennessee's high PRC share places it 4th overall in expenditures per capita.

Projected Other Cancers PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Tennessee	4.787	3.925	Utah	2.951	2.420
Arkansas	4.777	3.917	Arizona	2.952	2.420
Mississippi	4.776	3.916	Hawaii	3.085	2.530
Kentucky	4.551	3.732	New Mexico	3.153	2.585
West Virginia	4.457	3.655	Kansas	3.177	2.605

Source: Milken Institute

Projected Expenditure for Other Cancers - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Delaware	410.4	298.8	New Mexico	154.4	114.5
South Dakota	388.2	283.8	Utah	166.3	121.2
Alaska	372.1	269.0	Hawaii	175.7	132.9
Tennessee	370.6	274.5	California	176.6	133.4
Kentucky	364.4	266.8	Arizona	178.6	130.8

Source: Milken Institute

PULMONARY CONDITIONS

States with high smoking rates, high levels of industrial and vehicle pollutants, and colder weather remain at the top of the list in the 2023 projections.

Kentucky ranks first in both the baseline and optimistic scenarios. However, while all states show increases in the baseline scenario, only ten states show increases in the optimistic scenario, with both Michigan and Massachusetts showing a decline in the percentage of PRC share of population. Based on expenditure rates, Kentucky again ranks first. It is followed by Missouri (15th in PRC share), South Dakota (23rd in PRC share), Alaska (31st in PRC share) and Delaware (13th in PRC share) due to the significantly higher treatment costs in those states.

Projected Pulmonary Conditions PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Kentucky	29.178	25.077	Hawaii	11.074	9.517
Maine	25.193	21.652	Nevada	12.403	10.660
West Virginia	25.036	21.517	New Mexico	12.871	11.062
Michigan	24.203	20.802	Utah	14.587	12.537
Massachusetts	23.505	20.202	Wyoming	15.089	12.968

Source: Milken Institute

Projected Expenditure for Pulmonary Conditions - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Kentucky	604.0	463.7	Hawaii	178.1	141.2
Missouri	538.0	417.8	New Mexico	182.0	141.5
South Dakota	536.2	411.0	California	234.9	186.1
Alaska	521.3	395.2	Utah	240.9	184.0
Delaware	494.0	377.0	New Jersey	245.8	193.2

Source: Milken Institute

DIABETES

Under the projections, diabetes PRC shares remain strong in states that were centers for the disease in the 2003 data—particularly in the Southeast, the Appalachian states, and Mid-Atlantic states.

There are no dramatic changes among the top ten states, although Maine (2nd) has moved up from 11th in 2003, and Pennsylvania remains in 5th place. Alabama, which ranked 6th in 2003, falls to 8th, and Mississippi, which had ranked 1st in 2003, maintains its position. Among the bottom five states, Kansas and Wisconsin, previously ranked 7th and 6th, now rank 4th and 5th. Utah, which had previously ranked 4th, drops out of the bottom five to rank 6th (44th from the top). Montana, which ranked 5th in 2003, moves to 16th (34th from the top) in 2023. The second table shows that by expenditure rates, the top three states are Maine, Mississippi, and Delaware, despite Delaware ranking just 11th in PRC share. Alaska rises to 20th in expenditure rate, despite being 49th in PRC.

Projected Diabetes PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Mississippi	9.439	8.183	Colorado	3.781	3.278
Maine	8.445	7.322	Alaska	4.057	3.518
West Virginia	8.427	7.307	Minnesota	4.214	3.653
South Carolina	7.805	6.767	Kansas	4.543	3.939
Pennsylvania	7.186	6.231	Wisconsin	4.728	4.099

Source: Milken Institute

Projected Expenditure for Diabetes - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Maine	374.8	288.6	Colorado	156.7	121.0
Mississippi	352.5	272.6	New Mexico	174.1	136.5
Delaware	330.1	254.1	Utah	179.2	138.0
West Virginia	324.7	256.4	Kansas	182.1	143.0
South Carolina	313.4	241.8	Oklahoma	183.6	143.8

Source: Milken Institute

HYPERTENSION

Projections for the 2023 data show hypertension remaining concentrated in the same regions as in 2003, the Southeast and Appalachian states.

Under the baseline scenario, hypertension PRC share shows increases in all states in 2023, with Tennessee dropping from 5th to 10th. Florida ranks 4th, moving up from 8th in 2003. The bottom five states are fairly consistent, with New Mexico moving from 4th place in 2003 to 8th in 2023. Hawaii moves from 8th in 2003 to 4th in 2023. Under the optimistic scenario, only Mississippi (1st), Vermont (27th), Wyoming (37th), New Mexico (43rd), and Arizona (44th) show an increase in PRC share, with the other forty-five states showing slight declines. In projected expenditures, Delaware, West Virginia, Kentucky, and Mississippi rank as the top four states, despite Kentucky ranking 7th and Delaware 11th in terms of PRC share of population. Alaska's higher costs once again affect its ranking, moving it from 48th in PRC share and to 16th place in expenditures.

Projected Hypertension PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Mississippi	20.717	16.844	Utah	9.955	0.325
West Virginia	20.028	16.284	Colorado	10.085	0.330
Alabama	19.659	15.984	Alaska	10.760	0.364
Florida	17.692	14.384	Hawaii	11.538	0.381
Arkansas	17.586	14.298	Montana	11.788	0.382

Source: Milken Institute

Projected Expenditure for Hypertension - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Delaware	417.3	301.2	Utah	162.8	117.6
West Virginia	379.6	281.1	New Mexico	164.9	121.3
Kentucky	379.3	275.4	Hawaii	177.4	133.1
Mississippi	378.0	274.1	California	183.1	137.2
Tennessee	359.3	263.8	Colorado	186.6	135.1

Source: Milken Institute

HEART DISEASE

Because the recent increase in heart disease rates is heavily dependent on behavioral risk factors, differences in baseline and optimistic PRC percentage of population are more significant than for virtually all other diseases profiled.

The top five states for heart disease remain largely unchanged from the 2003 data, with Pennsylvania dropping from 5th to 11th. Florida moves from 8th to 5th, chiefly due to its larger retirement-age population. Among the bottom five states, the only significant change is New Mexico, which rises from 46th in 2003 to 25th in the 2023 data. The top three states for expenditures are South Dakota, West Virginia, and North Dakota, despite North Dakota ranking 7th in PRC share and South Dakota ranking 20th.

Projected Heart Disease PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
West Virginia	12.447	8.137	Utah	4.152	2.715
Mississippi	11.150	7.289	Alaska	4.826	3.155
Alabama	10.488	6.857	Colorado	4.997	3.267
Oklahoma	10.304	6.736	Minnesota	5.419	3.543
Florida	9.602	6.277	Oregon	6.200	4.053

Source: Milken Institute

Projected Expenditure for Heart Disease - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
South Dakota	954.5	556.6	Utah	274.1	159.2
West Virginia	919.4	547.6	Connecticut	373.3	224.9
North Dakota	917.9	548.6	Colorado	386.7	225.2
Missouri	905.2	534.8	New Jersey	389.7	232.9
Delaware	858.9	498.7	California	390.2	235.1

Source: Milken Institute

STROKE

Stroke PRC share of population in the 2023 projections continues to show significant geographic overlap with hypertension rates. The states with high stroke PRC percentage of population in 2023 are very similar to those in the 2003 data, with the exception of Maine, which rises from 14th in the 2003 data to 4th in the 2023 projections. Pennsylvania drops from 5th in 2003 to 7th in 2023. Among the states in the lower tiers, there are no significant changes, with the bottom ten matching for both 2003 and 2023, albeit in a slightly changed order.

In the baseline projections, all states show increased PRC share, with the most dramatic increases belonging to North Dakota (from 1.23 percent to 1.49 percent), Maine (0.99 percent to 1.24 percent), and Montana (0.86 percent to 1.11 percent). In the optimistic projection, only Maine (4th), Montana (13th), Vermont (19th), Wyoming (21st), New Hampshire (38th), New Mexico (43rd), and Alaska (49th) show increases in PRC shares. In terms of per capita expenditures, North Dakota, West Virginia, South Carolina, and Maine rank highest.

Projected Stroke PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
North Dakota	1.489	1.209	Utah	0.550	0.446
West Virginia	1.261	1.023	Alaska	0.601	0.487
Iowa	1.256	1.019	New York	0.648	0.526
Maine	1.238	1.004	Colorado	0.650	0.528
Arkansas	1.208	0.980	Nevada	0.680	0.551

Source: Milken Institute

Projected Expenditure for Stroke - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
North Dakota	194.9	144.6	Utah	63.2	45.6
West Virginia	171.0	126.5	New Jersey	76.2	56.5
South Carolina	169.5	122.5	California	76.7	57.4
Maine	168.6	121.6	Arizona	79.4	57.6
South Dakota	167.4	121.2	New York	80.0	59.3

Source: Milken Institute

MENTAL DISORDERS

The PRC share increases in all states in 2023 baseline and optimistic scenarios. Oregon, Massachusetts, and Montana maintain their positions at the top of the list in both the 2003 and 2023 data. However, Vermont (4th) and New Mexico (5th) move ahead of Wisconsin (4th in 2003) and Minnesota (5th in 2003). The latter two states drop to 6th and 7th in the projections. Pennsylvania rises from 47th in 2003 to 15th in 2023. By expenditure rates, the top states are Alaska, Oregon, Nevada, and Massachusetts, despite a PRC share ranking of 11th for Nevada and 14th for Alaska.

Projected Mental Disorders PRC - Percentage of Population, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Oregon	22.646	19.850	Washington	6.588	5.774
Massachusetts	21.841	19.144	North Dakota	8.706	7.632
Montana	20.851	18.276	California	9.397	8.236
Vermont	19.548	17.134	New York	10.544	9.242
New Mexico	19.526	17.115	Mississippi	10.931	9.581

Source: Milken Institute

Projected Expenditure for Mental Disorders - Per Capita, 2023

Top Five States	Baseline	Optimistic	Bottom Five States	Baseline	Optimistic
Alaska	864.8	668.4	Washington	246.4	193.7
Oregon	789.4	619.2	Texas	249.8	196.5
Nevada	782.2	593.4	Mississippi	259.5	202.9
Massachusetts	776.0	619.9	California	273.9	221.2
Montana	737.3	579.7	Oklahoma	280.2	221.9

Source: Milken Institute

III: Historical Indirect Impacts (Forgone Economic Growth)

Good health is a vital component of individual well-being. But it also plays a major role in employee productivity. When individuals suffer from chronic disease, the result is often diminished productivity, in addition to lost workdays. An ill employee who shows up for work (to avoid sick days, for example) may not perform well, a circumstance known as "presenteeism." Output loss due to presenteeism is immense; some literature suggests that for certain diseases, it can be up to fifteen times greater than for absenteeism, which is defined as work missed due to sick days, etc.[63]

Caregivers also contribute to lost productivity through missed workdays and presenteeism. Currently, more than 20 million full-time employees provide care to others.[64] For this study, therefore, it is necessary to consider both employee groups—caregivers as well as patients—for a more complete picture of the indirect impacts of chronic disease due to lost workdays and presenteeism.

A. Data and Methodology

Methodology for Individuals with Chronic Disease

To calculate the impacts of lost workdays and presenteeism for individuals with chronic disease (not for caregivers), we use data from the National Health Interview Survey (NHIS). This is a nationally representative sample of the population and comprises several components: the family core, a household level, person level, a sample adult file, and a sample child file. The sample adult file is representative of the adult U.S. population when appropriately weighted.

The NHIS dataset does not provide numbers of lost workdays per particular disease, forcing the use of a proxy in this regard. We take one of the survey questions from the sample adult file—"During the past twelve months, about how many days did you "miss job or business due to illness or injury (not including maternity leave)?"—and match all individuals (whom we call the Employed Population Reporting Condition) who have ever had a particular illness with the number of lost workdays in past twelve months due to illness or injury.

EPRC for the U.S.* - Millions, 2003

Chronic Disease	EPRC
Cancer	5.9
Asthma	13.8
Diabetes	5.9
Hypertension	27.2
Heart Disease	9.5
Stroke	1.1
Emotional Disturbances	7.7

* Employed Population Reporting a Condition

Sources: NHIS, Milken Institute

63 "The Hidden Competitive Edge - Employee Health and Productivity," (Newton, MA: Employers Health Coalition, 2000).
64. National Alliance for Caregiving and AARP, "Caregiving in the U.S." 2004.

The indirect impacts are estimated on the basis of wage rates and output (GDP). To do this we multiply the number of lost workdays by disease and wages per employee (GDP per employee). All through this section, we refer to wage-based impact evaluated at the average wage rates per employee. We take a similar approach when presenting results in terms of output.

To estimate individual (EPRC) presenteeism, we rely on a 2004 study by Goetzel et al.,[65] reporting disease-specific costs (in addition to treatment costs) related to absenteeism and presenteeism. In the following table, we provide absenteeism and presenteeism costs, as reported by the study. These are costs derived on an employee basis, meaning they are spread out across a firm's entire work force.

Costs Related to Absenteeism and Presenteeism - US$ Per Employee, Annual

Chronic Disease	Absenteeism	Presenteeism
Cancer	4.5	75.7
Asthma	2.1	72.2
Respiratory Infections	27.5	33.3
Diabetes	19.2	158.8
Hypertension	46.7	246.7
Heart Disease	19.2	70.5
Emotional Disturbances	33.4	246.0

Source: Journal of Occupational and Environmental Medicine, 2004

We use disease-specific ratios of presenteeism to absenteeism (from the Goetzel study) and our estimates from individual lost workdays to derive indirect impacts due to individual presenteeism.[66]

Methodology for Caregivers

To determine the impact of caregiver lost workdays, we use estimates from two studies, the first conducted in 2004 by National Alliance for Caregiving and AARP,[67] the second by Metlife in 2006.[68] The former measured the total number of U.S. caregivers and determined the total to be 44.4 million (39 percent male, 61 percent female). Of those, 60 percent of the men and 41 percent of women are employed full time. The Metlife study concludes that 10 percent of male caregivers miss, on average, nine workdays a year. Among female caregivers, 18 percent miss an average of 24.75 workdays. We use these statistics to derive lost workdays at the national level.

65. Goetzel et al. "Health, Absence, Disability, and Presenteeism Cost Estimates of Certain Physical and Mental Health Conditions Affecting U.S. Employers." *Journal of Occupational and Environmental Medicine*. Vol 46. 2004.

66. For example, the ratio of presenteeism to absenteeism from Goetzel et al. for cancer was almost 17 times. We multiplied that ratio with our estimate of impact of an individual's lost workdays for cancer ($6.1 billion) to obtain individual's presenteeism for cancer (i.e., 17 x 6.1 = $103.7 billion).

67. National Alliance for Caregiving (NAC) and AARP. "Caregiving in the U.S." 2004.

68. Metlife Mature Market Institute, National Alliance for Caregiving, 2006. "The Metlife Caregiving Cost Study: Productivity Losses to U.S. Business." See: http://www.caregiving.org/data/Caregiver%20Cost% 20Study.pdf.

Caregivers in the U.S. - Millions

Caregivers	Gender: Male	Gender: Female
Total	17.3	27.1
Full-Time Employed	10.4	11.1

Source: NAC and AARP, 2004

Caregivers' lost workdays for each disease are calculated by applying the disease-specific percentage of the individual lost workdays against all lost workdays due to illness or injury. To estimate caregiver presenteeism, we calculate the number of Employed Caregivers by Condition (ECC).[69] The following table depicts ECC by disease.

ECC for the U.S.* - Millions, 2003

Chronic Disease	ECC
Cancer	0.77
Asthma	1.78
Diabetes	0.76
Hypertension	3.52
Heart Disease	1.23
Stroke	0.14
Emotional Disturbances	1.00

* Employed Caregivers by Condition

Sources: NAC, Milken Institute

Next we calculate ECC-adjusted individual presenteeism.[70] Following a study by Levy,[71] we allocate 75 percent of ECC-adjusted individual presenteeism as caregiver presenteeism.[72] We follow the same methodology to estimate caregiver presenteeism for other diseases, then allocate these across states and regions. Again, all state estimates are obtained using state-specific PRC. Those PRC totals are calculated from prevalence and incidence rates using different sources,[73] and the rates will influence these state-level impacts as well.

69. For example, we find that EPRC for cancer in 2003 (from individual lost workdays) totaled 5.92 million, which accounted for 3.5 percent of the total employed population in that year for the National Health Interview Survey. Following that, we allocate 3.5 percent of all full-time employed caregivers (21.5 million) to cancer (0.77 million).
70. For cancer, wage-based EPRC presenteeism totaled $103.7 billion. After adjusting for ECC, the total drops to $13.4 billion.
71. Levy D. "Presenteeism: A Method for Assessing the Extent of Family Caregivers in the Workplace and their Financial Impact" American Association for Caregiver Education Inc. (2003, 2007).
72. For cancer, 75 percent of $13.42 billion is $10.1 billion.
73. Sources include, for example, the Behavioral Risk Factor Surveillance System (BRFSS), CDC, State Cancer profile.

Summary of Findings

The historical indirect impacts here are based on (a) average wages and (b) nominal GDP. The following table summarizes national-level, wage-based indirect impacts for 2003.

Wage-Based Indirect Impacts for the U.S. - US$ Billions, 2003

	Individual		Caregiver		
Chronic Disease	Lost Workdays	Presenteeism	Lost Workdays	Presenteeism	Total
Cancer	6.1	103.7	0.45	10.1	120.4
Breast Cancer	0.7	11.8	0.05	1.1	13.7
Colon Cancer	0.5	8.4	0.04	0.8	9.7
Lung Cancer	0.8	13.5	0.06	1.3	15.7
Prostate Cancer	0.5	9.1	0.04	0.9	10.6
Other Cancers	3.6	61.0	0.26	5.9	70.7
Asthma	8.3	29.7	0.61	2.9	41.6
Diabetes	4.6	37.8	0.34	3.7	46.4
Hypertension	18.2	94.5	1.79	9.2	123.6
Heart Disease	9.1	33.1	0.90	3.2	46.3
Stroke	1.7	7.3	0.12	0.7	9.8
Emotional Disturbances	8.4	61.1	0.61	5.8	75.9
Total	56.4	367.2	4.81	35.5	464.0

Source: Milken Institute

As depicted, total wage-based historical indirect impacts (lost workdays and lower employee productivity) amounted to $464.0 billion in 2003.[74] They were highest for hypertension, at $123.6 billion, followed by cancer at $120.4 billion. Stroke ranks lowest, at $9.8 billion.

Lost EPRC workdays are most associated with hypertension and least with stroke ($1.7 billion). EPRC presenteeism is most associated with cancer, at $103.7 billion. For caregivers, lost workdays are also most associated with hypertension, and presenteeism with cancer. It is not surprising that presenteeism is highest for cancer, but the high impacts for hypertension are puzzling. The low impact of stroke may be attributable to a significant number of affected employees who leave the work force altogether and enter managed care.

74. It is to be noted that comorbidities are involved in this estimate. So the total indirect impact estimate should be used with caution.

The following table illustrates the historical indirect impacts per EPRC and the ECC.

Wage-Based Indirect Impacts per Employee - US$ Thousands, 2003

	Individual*		Caregiver**	
Chronic Disease	Lost Workdays	Presenteeism	Lost Workdays	Presenteeism
Cancer	1.0	17.5	0.6	13.1
Asthma	0.6	2.2	0.3	1.6
Diabetes	0.8	6.4	0.4	4.8
Hypertension	0.7	3.5	0.5	2.6
Heart Disease	1.0	3.5	0.7	2.6
Stroke	1.5	6.6	0.9	5.0
Emotional Disturbances	1.1	7.9	0.6	5.8
Total	0.8	5.2	0.5	3.9

* Per EPRC
** Per ECC
Source: Milken Institute

Stroke has a higher per-EPRC impact than either heart disease or hypertension on lost workdays. Moreover, individual presenteeism for stroke is considerably higher than it is for heart disease and hypertension. However, individual presenteeism is highest for cancer and emotional disturbances.[75] For caregivers, presenteeism is highest for cancer, followed by emotional disturbances.[76] Much of this presenteeism is attributable to caregiver stress.[77]

To obtain indirect impacts of different types of cancers, we use the expenditure shares for different types of cancer, shown in an earlier table on "Direct Costs by Chronic Disease, 2003". For example, we apply the expenditure share of lung cancer[78] to the indirect impacts of all cancers and attribute that as the indirect impact of lung cancer. Of the cancers examined, lung cancer had the highest 2003 wage-based indirect impact, at $15.7 billion, followed by breast cancer ($13.7 billion); prostate cancer ($10.6 billion); and colon cancer ($9.7 billion).

Most analyses of the indirect impacts of chronic disease base their estimates on average wages. Wages are the most accurate measure for evaluating the value of marginal reduction in lost work hours or productivity. But GDP per employee is more accurate for evaluating the marginal loss to the firm or to the overall economy. It captures the total value of the forgone output.

In the following table, indirect impacts for cancer and diabetes, based on output (GDP), total $271.2 billion and $104.7 billion, respectively. The indirect impacts for cancer and diabetes, based on wages, total much less, $120.4 billion and $46.4 billion. Thus, we can see that output-based estimates total more than twice the wage-based estimates. This pattern is similar to that found in comparisons of average wages and GDP per employee. In 2003, the average wage per employee was $37,000. GDP per employee totaled $84, 000,[79] again a little more than twice the wages per employee.

75. An article published in the *Medical News Today* reports that the presenteeism for depressed employees is very high ("Depressed Employees Vulnerable to Presenteeism and Absenteeism," December 12, 2006).
76. Indirect impacts are based on NHIS data, which refers to "emotional disturbances."
77. For example, the National Alliance for Caregiving (NAC) and AARP "Caregiving in the U.S." (2004) reported that a caregiver's main health problems are emotional.
78. Breast cancer accounted for 11 percent of total expenditure on cancer; colon (8 percent), lung cancer (13 percent), and prostate cancer (9 percent). Other types of cancer constituted the rest, 59 percent.
79. Sources: Bureau of Labor Statistics and Bureau of Economic Analysis through Economy.com.

GDP-Based Indirect Impacts for the U.S. - US$ Billions, 2003

	Individual		Caregiver		
Chronic Disease	Lost Workdays	Presenteeism	Lost Workdays	Presenteeism	Total
Cancer	13.8	233.7	1.0	22.7	271.2
Breast Cancer	1.6	26.5	0.1	2.6	30.8
Colon Cancer	1.1	18.8	0.1	1.8	21.9
Lung Cancer	1.8	30.4	0.1	3.0	35.3
Prostate Cancer	1.2	20.5	0.1	2.0	23.8
Other Cancers	8.1	137.3	0.6	13.3	159.4
Asthma	18.8	67.0	1.4	6.5	93.7
Diabetes	10.4	85.3	0.8	8.3	104.7
Hypertension	41.1	213.6	4.0	20.7	279.5
Heart Disease	20.6	74.8	2.0	7.2	104.6
Stroke	3.8	16.5	0.3	1.6	22.1
Emotional Disturbances	18.9	137.4	1.4	13.2	170.9
Total	127.4	828.2	10.8	80.2	1,046.7

Source: Milken Institute

B. State Variations

To determine lost workdays by census regions (and control for inter-regional variations), we obtain the three-year average (2003–2005) of EPRC and lost workdays per EPRC. The averages are scaled up to national values to obtain final totals for EPRC and revised lost workdays per EPRC.

In 2003, the Midwest and South were subject to the largest wage-based impacts for most disease types, as shown in the next table.

Wage-Based Indirect Impacts by Region. - US$ Billions, 2003

Chronic Disease	Northeast	Midwest	South	West
Cancer	29.0	28.3	40.9	22.2
Breast Cancer	4.0	3.1	4.3	2.4
Colon Cancer	2.1	2.0	3.5	2.2
Lung Cancer	3.8	3.1	5.6	3.4
Prostate Cancer	3.0	2.7	3.2	1.9
Other Cancers	16.1	17.4	24.2	12.4
Asthma	9.6	11.0	11.5	9.5
Diabetes	10.3	11.8	17.3	7.0
Hypertension	23.1	30.2	48.4	21.5
Heart Disease	9.3	10.1	18.7	8.1
Stroke	2.5	1.2	4.5	1.6
Emotional Disturbances	18.4	18.9	21.8	16.7
Total	131.1	139.7	204.0	108.8

Source: Milken Institute

However, if we study per capita indirect impacts, the Northeast has the highest impact (except for hypertension and heart disease). The Midwest and South have almost identical impacts from hypertension and lead in regional distributions. The South and the Northeast feel the greatest impacts from heart disease. The West has consistently low impacts from all disease types, except for asthma[80] and emotional disturbances. Meanwhile, the South has the lowest per capita impacts from asthma and emotional disturbances. Studying the per capita state impacts offers a clearer picture of regional distribution.

We obtain state-level indirect impact estimates by applying the state PRC percentage of national PRC to the disease-specific national indirect impact. Variations in historical indirect impacts between states depend primarily on two factors. The first is related to variations in state wage rates and GDP, some of which are ranked in the next table.

Wages and GDP - Per Capita, 2003

Top 5 States		Bottom 5 States	
Wages	GDP	Wages	GDP
Connecticut	Delaware	Montana	Montana
New York	Connecticut	South Dakota	West Virginia
New Jersey	New York	Mississippi	North Dakota
Massachusetts	California	North Dakota	Mississippi
California	Alaska	Idaho	Maine

Sources: BLS, BEA

The second factor is PRC on a per capita basis. The following table shows the five top- and bottom-ranked states according to their 2003 per capita PRC totals.

PRC by Disease - Per Capita, 2003

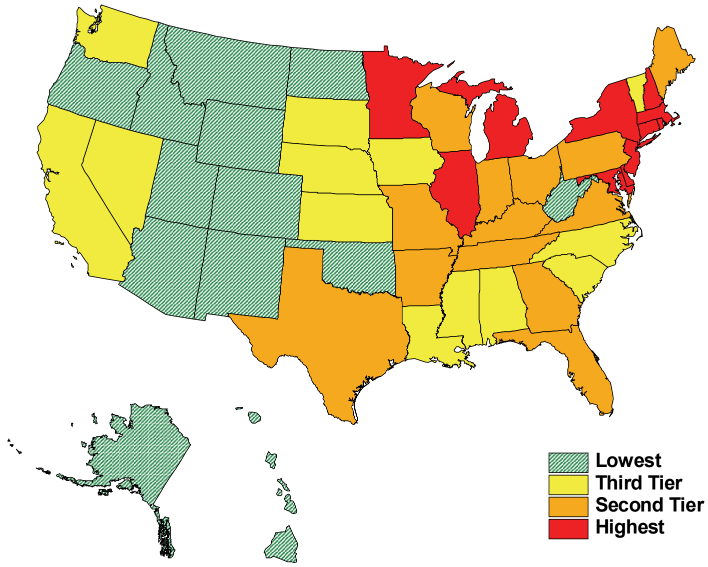
States	Cancer	Diabetes	Hypertension	Heart Disease	Stroke	Emotional Disturbances	Asthma
Top 5	Arkansas	Mississippi	West Virginia	West Virginia	North Dakota	Oregon	Kentucky
	Tennessee	West Virginia	Mississippi	Oklahoma	Arkansas	Massachusetts	Michigan
	Mississippi	Tennessee	Alabama	Mississippi	Iowa	Montana	Maine
	Kentucky	South Carolina	Arkansas	Alabama	West Virginia	Wisconsin	Massachusetts
	Maryland	Pennsylvania	Tennessee	Pennsylvania	Pennsylvania	Minnesota	West Virginia
Bottom 5	Arizona	Colorado	Utah	Alaska	Alaska	Washington	Hawaii
	New Mexico	Alaska	Colorado	Utah	Utah	North Dakota	Nevada
	Hawaii	Minnesota	Alaska	Colorado	Colorado	California	New Mexico
	Utah	Montana	New Mexico	Minnesota	New Mexico	New York	Utah
	Alaska	Utah	Montana	New Mexico	Arizona	Mississippi	Wyoming

Soures: MEPS, Milken Institute

Variation among states also depends on the relative strength of these two factors. Taking cancer as an example, the following figure explains the wage-based per capita impacts in 2003. Generally, states having the highest impacts also report high wage rates. California proves to be an exception here. The state has a high wage rate, but a low per capita PRC for cancer. Illinois, Minnesota, and Michigan also have low per capita PRC totals for cancer. Since their wage rates are above the median wage rate for all states, they fall into the highest tier.

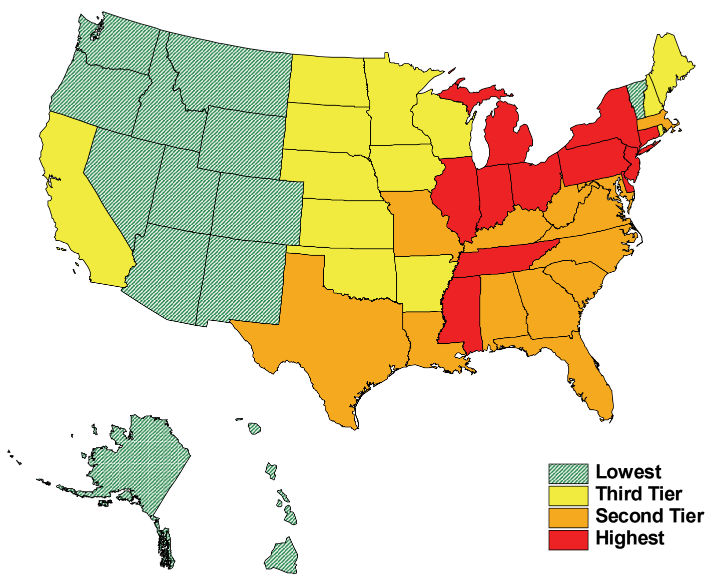
80. Indirect impacts are based on NHIS data, which use the term "asthma," a subset of pulmonary conditions.

Wage-Based per Capita Indirect Impacts of Cancer, 2003



A comparison of the historical indirect impacts of diabetes (2003) does not show much difference. The following figure illustrates the wage-based per capita indirect impacts of diabetes for 2003.

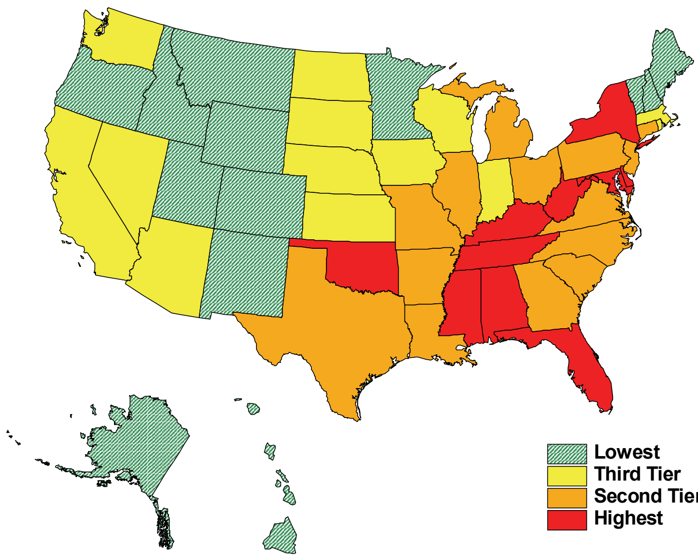
Wage-Based per Capita Indirect Impacts of Diabetes, 2003



The chief difference between diabetes and cancer is that most of the Southern states move into second tier. Tennessee and Mississippi move to the highest tier. Other states climbing up the ladder to the highest tier include Indiana, Ohio, and Pennsylvania. On the brighter side, Minnesota moves down to the third tier in impact, even though state wage rates are high. If we refer back to an earlier table describing per capita PRC, we see that Minnesota is among the bottom five states. On the other hand, Mississippi has the highest per capita PRC for diabetes, followed by West Virginia, Tennessee, and Pennsylvania. Those high totals translate into high indirect impacts.

In the South, wage-based per capita indirect impacts are highest for hypertension and heart disease.

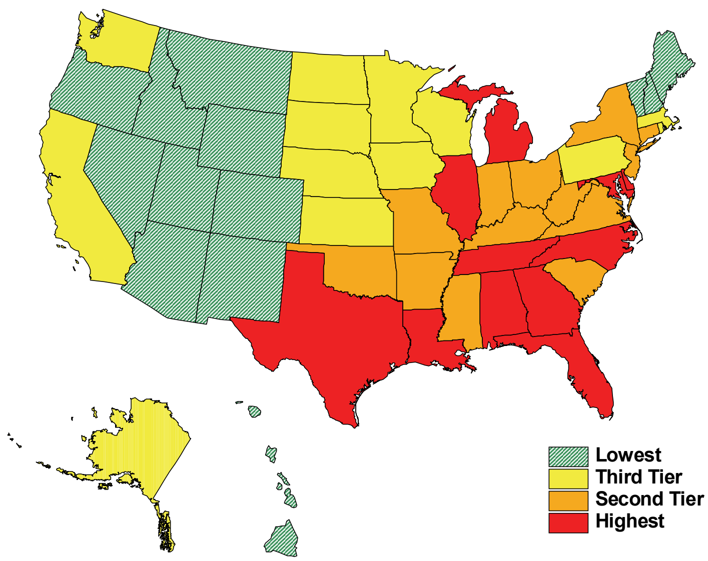
Wage-Based per Capita Indirect Impacts of Heart Disease, 2003



For heart disease, most Southern states have very high PRC totals per capita. Yet low wage rates put those states in the second impact tier. New York, in the highest tier, has both high PRC totals and high wage rates. Oklahoma, also in the highest tier, has one of the highest PRC totals but ranks among the bottom states for wage rates.

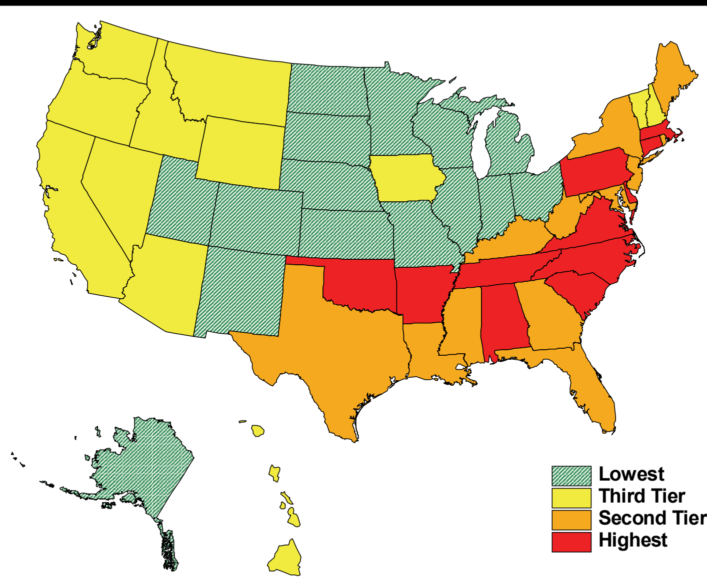
The following figure shows output-based historical indirect impacts of hypertension. Texas ranks higher in output (GDP) than wage rates; thus, the output-based impacts are higher than wage-based impacts. North Carolina's per capita hypertension PRC total ranks among the top fifteen states, placing it in the highest tier. Meanwhile, Pennsylvania, which doesn't sit among the top fifteen states for either output or PRC, moves down to the third tier.

GDP-Based per Capita Indirect Impacts of Hypertension, 2003



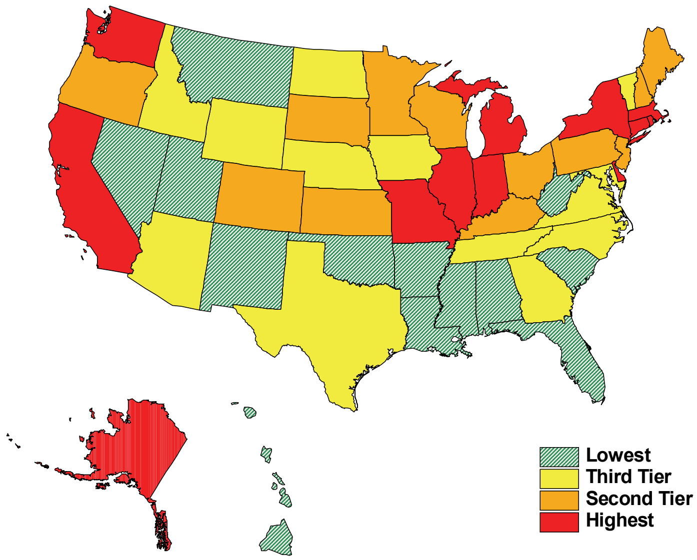
North Dakota has the highest per capita stroke PRC totals. Yet as shown in the next figure, the state sits in the lowest tier, because of its low GDP. Meanwhile, New York has a low stroke PRC totals, but very high GDP rates, and the indirect impacts put the state in the second tier.

GDP-Based per Capita Indirect Impacts of Stroke, 2003



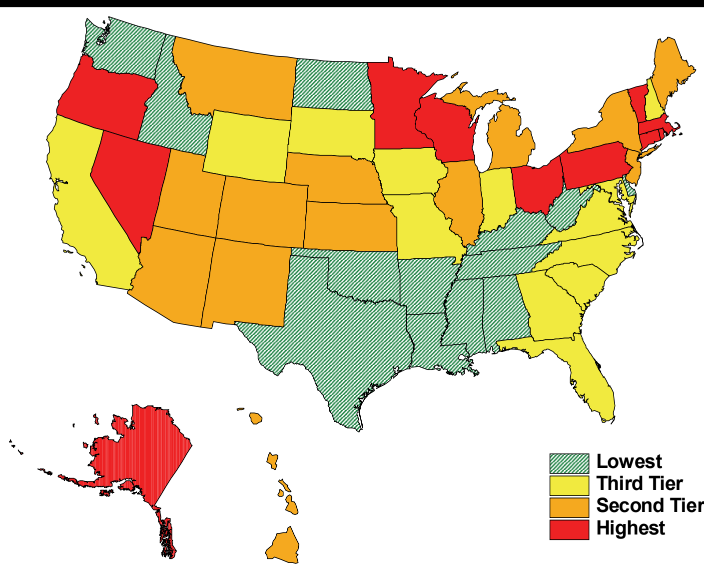
Western states, which have stayed among the bottom tiers in this discussion, show greater impacts from asthma and emotional disturbances. As noted previously, California has very high wage rates and GDP, but low per capita PRC totals for many diseases. But the state reports one of the highest prevalence rates for asthma and therefore is among the states with highest impacts.[81]

GDP-Based per Capita Indirect Impacts of Asthma, 2003



For emotional disturbances, Oregon tops the list for PRC, followed by Massachusetts, Montana, Wisconsin, and Minnesota. Nevada is also one of the top fifteen states for per capita PRC.

Wage-Based per Capita Indirect Impacts of Emotional Disturbances, 2003



81. Behavioral Risk Factor Surveillance System (CDC).

Thus, for each of these diseases, state variations are chiefly attributable to variations in PRC, prevalence/ incidence rates, and wage rates/GDP levels.

A Comparison of Different Studies - US$ Billions

Chronic Disease	Indirect Impacts* Milken Study	Indirect Impacts* Other Studies	Source of Other Studies
Cancer	120.4	135.9	American Cancer Society
Asthma	41.6	8.0	American Lung Association
Diabetes	46.5	40.0	American Diabetes Association
Hypertension	123.7	64.0**	Centers for Disease Control and Prevention
Heart Disease and Stroke	56.1	161.0	Centers for Disease Control and Prevention
Emotional Disturbances	75.9	105.0	National Mental Health Association/CDC

* Wage-Based Indirect Impacts

**Including Medical Costs

Studies on the indirect impacts of chronic disease vary in scope. Yet none of these address the indirect impacts of caregivers.

- The American Cancer Society estimates lost productivity of $135.9 billion, compared to our figure of $120.4 billion, a difference explained because this study does not address lost productivity due to leaving the labor force or death.
- The American Diabetes Association (ADA) estimates the wage impact of lost workdays for diabetes at $4.5 billion for 2002—very close to our estimate of $ 4.6 billion for 2003. The ADA study also includes impacts from death, permanent disability, and days of restricted activity. The study does not, however, measure presenteeism and the effect on businesses due to caregiving.
- The American Lung Association estimates lost earnings of $8 billion due to illness or death.
- Similarly, The National Mental Health Association/CDC estimates lost productivity valued at $105 billion for mental illness (and $8 billion more due to crime and welfare losses).
- The CDC estimates indirect impacts, in terms of lost productivity and absenteeism, for heart disease and stroke to be around $161 billion. Our figure is much lower, at $56.1 billion.

Our study differs in a number of ways: We examine the impact of lost workdays due to specific diseases. We look at productivity loss in terms of presenteeism. We also include impacts employed caregivers exert on businesses.

Indeed, the economy might suffer considerable productivity losses due to individuals leaving the labor force either because of the illness or caregiving requirements. But we do not consider those effects in this study. Nor do we consider the forgone economic growth attributable to death and disability. However, we do incorporate the impacts of *reducing* premature death in our intergenerational estimates of forgone economic growth, where we examine the marginal influence on growth of increasing life expectancy by one year. We are examining the impacts of chronic disease on businesses, and productivity losses due to individuals or caregivers who leave labor force are not included in this study. Thus, our estimates of the indirect impacts of these chronic diseases should be considered conservative.

IV: Projections of Avoidable Indirect Impacts (Forgone Economic Growth)

A. Baseline and Optimistic Projections

Baseline Scenario

In developing baseline and optimistic scenarios of future indirect impacts, we use employment and population projections to calculate employment-to-population ratios (the population as defined by 16 and older). By dividing the ratio for every year by the ratio of 2003, we build an **E/P index**.[82]

Projection of Employment and Population

Year	Employment (Millions)	Population* (Millions)	Employment/ Population	E/P Index
2003	130.0	225.2	0.58	1.000
2004	131.4	227.7	0.58	1.000
2005	133.5	230.3	0.58	1.004
2006	135.4	233.0	0.58	1.006
2007	136.8	235.7	0.58	1.005
2008	138.3	238.2	0.58	1.006
2009	140.1	240.6	0.58	1.008
2010	142.0	242.9	0.58	1.013
2011	144.0	245.1	0.59	1.017
2012	145.9	247.3	0.59	1.022
2013	147.8	249.3	0.59	1.027
2014	149.8	251.3	0.60	1.032
2015	151.7	253.4	0.60	1.037
2016	153.7	255.4	0.60	1.042
2017	155.7	257.6	0.60	1.047
2018	157.6	259.8	0.61	1.051
2019	159.6	261.9	0.61	1.056
2020	161.6	264.1	0.61	1.060
2021	163.5	266.3	0.61	1.064
2022	165.4	268.5	0.62	1.067
2023	167.3	270.7	0.62	1.070

* Adult Population is defined as 16 years and over

Sources: BLS, U.S Census, Economy.com, Milken Institute

We next create a **baseline PRC index** for each disease. This is built by dividing baseline PRC (obtained from "Projecting Avoidable Direct Costs," Part II) for every year by baseline PRC for 2003. The table on the next page provides a PRC index for cancer. The index reading for 2004 (1.03) is derived by dividing 2004 PRC (10.93 million) by 2003 PRC (10.58 million).

We multiply the E/P index by the PRC index to create an **E/P-PRC index**, also shown in the next table. This index is scaled to the 2003 EPRC to obtain projections of EPRC by disease. For example, in 2003, the cancer EPRC totaled 5.92 million (obtained in Part III, Section A). Hence, each year's EPRC is multiplied by 5.92 million to obtain cancer projections of EPRC through 2023.[83]

Baseline EPRC totals are converted into lost workdays and presenteeism for both Individuals and caregivers, consistent with the methodology used to estimate the indirect impacts (Part III, Section A).

We then use projections of wages and nominal GDP, respectively, to obtain wage- and GDP-based projections of indirect impact for the baseline scenario.

82. For example, the E/P index for 2004 was derived by dividing the 2004 employment-to-population (0.58) by the 2003 ratio (0.58).
83. We followed the same methodology to calculate projections of ECC by disease.

Cancer - Projection of Lost Workdays

Year	PRC (Millions)	PRC Index	E/P-PRC Index*	EPRC (Millions)	Lost Workdays (Millions)
2003	10.58	1.00	1.00	5.92	60.14
2004	10.93	1.03	1.03	6.11	62.09
2005	11.25	1.06	1.07	6.36	64.59
2006	11.61	1.10	1.10	6.58	66.81
2007	12.00	1.13	1.14	6.79	68.99
2008	12.35	1.17	1.17	6.99	71.04
2009	12.70	1.20	1.21	7.21	73.22
2010	13.03	1.23	1.25	7.43	75.44
2011	13.36	1.26	1.28	7.65	77.73
2012	13.72	1.30	1.33	7.90	80.22
2013	14.06	1.33	1.36	8.13	82.58
2014	14.39	1.36	1.40	8.36	84.91
2015	14.71	1.39	1.44	8.59	87.22
2016	15.01	1.42	1.48	8.81	89.48
2017	15.33	1.45	1.52	9.03	91.73
2018	15.64	1.48	1.55	9.26	94.05
2019	15.97	1.51	1.59	9.49	96.39
2020	16.30	1.54	1.63	9.73	98.81
2021	16.62	1.57	1.67	9.95	101.11
2022	16.95	1.60	1.71	10.18	103.44
2023	17.28	1.63	1.75	10.41	105.74

* E/P-PRC Index was created by multiplying the E/P Index with the PRC Index

Sources: BLS, U.S.Census, Economy.com, Milken Institute

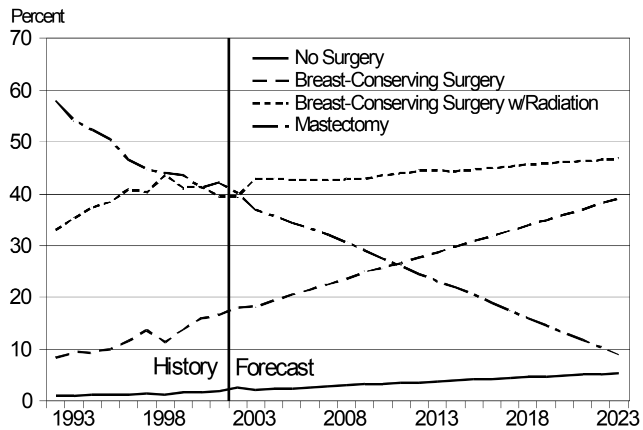
Optimistic Scenario

In this scenario, the indirect economic impacts of lost workdays are calculated as they were for the baseline scenario, using optimistic PRC figures from Part II, Section B, "Projecting Avoidable Direct Costs: Findings of the Baseline and Optimistic Scenarios." However, we don't just want to incorporate optimistic PRC. We also want to include changes in treatment that will reduce presenteeism through less-invasive treatments and lower side effects. This reduction will ultimately affect the indirect impact ratio of presenteeism to lost workdays.

To quantify reductions in presenteeism, we rely chiefly on the National Cancer Institute. For example, to determine figures for cancer, we follow a statistical report of the National Cancer Institute on cancer treatment from 1992 to 2002.[84] (This report is one of the best available and can be used as a proxy to measure the relative invasiveness of treatment options for other diseases.) For breast cancer, the report looked at four options: (1) no surgery; (2) breast-conserving surgery (BCS) without radiation; (3) BCS with radiation; and (4) mastectomy. Ranking the four options, we project each out through 2023.

84. "Cancer Trends Progress Report: 2005." See: www.cancer.gov.

Female Breast Cancer Patients - Invasive Treatment Distributions



Sources: National Cancer Institute, Milken Institute

Still for breast cancer, we next want to calculate the indirect impact ratio of presenteeism to lost workdays. We assume it is affected by all four treatment options. However, we also assume that certain treatments will have a greater effect on presenteeism: (1) no surgery (highest); (2) BCS with radiation; (3) mastectomy; and (4) BCS without radiation (lowest). We cannot be sure about the magnitude of variations in the first three categories so give them equal weights (0.3 each) and 0.1 for treatment option (4), BCS without radiation. We deflate the 2003 baseline presenteeism to lost workdays impact ratio by the weighted index.[85] The following table shows the ratio of presenteeism to lost workdays for cancer.

Cancer - Presenteeism to Lost Workdays

Year	Presenteeism / Lost Workdays	Absolute Change
2003	16.95	–
2004	16.64	-0.308
2005	16.30	-0.343
2006	15.95	-0.343
2007	15.62	-0.340
2008	15.33	-0.284
2009	15.04	-0.294
2010	14.86	-0.177
2011	14.63	-0.229
2012	14.46	-0.166
2013	14.30	-0.169
2014	13.96	-0.333
2015	13.76	-0.204
2016	13.57	-0.190
2017	13.39	-0.182
2018	13.21	-0.178
2019	13.03	-0.179
2020	12.85	-0.177
2021	12.67	-0.182
2022	12.50	-0.173
2023	12.33	-0.171

Source: Milken Institute

85. For each series, we use 2003 as base year.

For other chronic diseases, we follow a similar approach to project the indirect impact ratio through an ordinal ranking, by disease, and try to ascertain the relative effects of the range of treatment options on each. The rationale behind such a ranking is partly borrowed from the number of ongoing clinical trials.

The next table gives totals for ongoing clinical trials, as of early 2007. Cancer is the subject of the most trials. We assume that more clinical trials will lead to less invasive treatment options and that EPRC totals will be greatly affected.

Clinical Trials by Disease

Chronic Disease	Total
Breast Cancer	543
Colon Cancer	337
Lung Cancer	441
Prostate Cancer	257
Heart Disease*	1,532
Diabetes	447
Pulmonary Conditions	145
Depression	297

* Including Hypertension and Stroke

Source: ClinicalTrials.gov

We also assume that less invasive treatment options will affect future presenteeism, another factor in building the ordinal ranking. The concept is summarized in the following table:

Effect of Invasive Treatments on Presenteeism by Disease

Chronic Disease	No Surgery	BCS* (without radiation)	Mastectomy	BCS* (with radiation)	Percent Compared to Cancer
Cancer	X	X	X	X	100
Heart Disease	X	X	X		60
Diabetes	X	X			35
Stroke	X				25
Asthma	X				20
Emotional Disturbances	X				15
Hypertension	X				10

* Breast-Conserving Surgery

Source: Milken Institute

Heart disease is affected by drugs ("no surgery," in the table); part-surgery (BCS without radiation); and full-surgery (mastectomy). Thus, using the uncertainty weight (0.3), we assume that the change in the ratio of presenteeism to lost workdays for each year is proportional to the change for cancer. The absolute difference in the cancer ratio between 2003 and 2004 was (-0.31). (Following this logic, heart disease should amount to 70 percent of the absolute difference of the cancer ratio. However, we use 60 percent to allow for any additional side effects specific to heart disease.) Finally we adjust for differences in 2003 cancer and heart disease impact ratio.[86] We follow this methodology in the following table.

Heart Disease - Presenteeism to Lost Workdays

Year	Presenteeism / Lost Workdays	Absolute Change
2003	3.63	-
2004	3.59	-0.046
2005	3.54	-0.051
2006	3.49	-0.052
2007	3.43	-0.051
2008	3.39	-0.043
2009	3.35	-0.044
2010	3.32	-0.027
2011	3.29	-0.034
2012	3.26	-0.025
2013	3.24	-0.025
2014	3.19	-0.050
2015	3.16	-0.031
2016	3.13	-0.029
2017	3.10	-0.027
2018	3.07	-0.027
2019	3.05	-0.027
2020	3.02	-0.027
2021	2.99	-0.027
2022	2.97	-0.026
2023	2.94	-0.026

Source: Milken Institute

Following a similar logic for diabetes, we use 35 percent of the absolute difference of the cancer ratio to allow for any additional side effects.

We assume that impact ratios for other diseases are only affected by drugs (no surgery). But in order to bring in some variation, we assume stroke will display 25 percent of the impact relative to cancer, followed by asthma (20 percent), emotional disturbances (15 percent), and hypertension (10 percent). A complete methodology is available online at www.chronicdiseaseimpact.com.

86. Hence, the final change in the impact ratio of presenteeism to lost workdays for heart disease from 2003 to 2004 will be (-0.31X 0.60) x (3.63/16.95).

B. Projections of Avoidable Indirect Impacts

The avoidable indirect economic impact is defined as the difference between the baseline and optimistic projections.

National-Level Avoidable Indirect Impacts

On the national level, the projected difference between the baseline and optimistic GDP-based scenarios for total avoidable indirect impacts in 2023 is $905 billion, reflecting a difference of 26.9 percent. The next table provides the comparisons by disease. The difference in the two GDP-based cancer scenarios, for example, is $373 billion in 2023. For heart disease, the difference is $137 billion.

For wage-based scenario projections, the total difference in 2023 comes to $390 billion. For cancer, the projected difference is $161 billion, a difference of 38.9 percent. For heart disease, the difference is $59 billion, or 43.0 percent.

2023 Projections of Wage-Based Indirect Impacts - US$ Billions

Chronic Disease	Baseline	Optimistic	Difference Absolute	Difference Percent
Cancer	414	253	-161	-38.9
Breast Cancer	44	28	-16	-36.1
Colon Cancer	30	19	-11	-38.1
Lung Cancer	45	27	-18	-39.9
Prostate Cancer	40	23	-17	-42.1
Other Cancers	254	156	-98	-38.6
Asthma	114	94	-20	-17.7
Diabetes	151	119	-31	-20.8
Hypertension	360	286	-74	-20.6
Heart Disease	137	78	-59	-43.0
Stroke	26	20	-6	-23.4
Emotional Disturbances	245	207	-38	-15.5
Total	1,448	1,058	-390	-26.9

Source: Milken Institute

2023 Projections of GDP-Based Indirect Impacts - US$ Billions

Chronic Disease	Baseline	Optimistic	Difference Absolute	Difference Percent
Cancer	960	587	-373	-38.9
Breast Cancer	101	66	-36	-35.1
Colon Cancer	69	42	-27	-38.8
Lung Cancer	105	63	-42	-39.8
Prostate Cancer	93	54	-39	-42.1
Other Cancers	592	362	-230	-38.9
Asthma	265	218	-47	-17.7
Diabetes	350	277	-73	-20.8
Hypertension	839	666	-172	-20.6
Heart Disease	319	182	-137	-43.0
Stroke	61	47	-14	-23.4
Emotional Disturbances	568	480	-88	-15.5
Total	3,363	2,458	-905	-26.9

Source: Milken Institute

Cumulative Total Wage-Based Indirect Impacts, 2004 - 2023 - US$ Billions

Chronic Disease	Baseline	Optimistic	Difference Absolute	Difference Percent
Cancer	5,098	3,835	-1,264	-24.8
Breast Cancer	564	444	-121	-21.4
Colon Cancer	369	273	-96	-26.0
Lung Cancer	572	427	-145	-25.4
Prostate Cancer	490	365	-124	-25.4
Other Cancers	3,103	2,326	-777	-25.1
Asthma	1,489	1,336	-153	-10.3
Diabetes	1,912	1,690	-222	-11.6
Hypertension	4,718	4,164	-554	-11.7
Heart Disease	1,763	1,309	-454	-25.8
Stroke	342	295	-47	-13.7
Emotional Disturbances	2,986	2,728	-258	-8.6
Total	18,308	15,356	-2,952	-16.1

Source: Milken Institute

Cumulative Total GDP-Based Indirect Impacts, 2004 - 2023 - US$ Billions

Chronic Disease	Baseline	Optimistic	Difference Absolute	Difference Percent
Cancer	11,894	8,946	-2,948	-24.8
Breast Cancer	1,317	1,035	-281	-21.4
Colon Cancer	860	636	-224	-26.0
Lung Cancer	1,335	995	-339	-25.4
Prostate Cancer	1,143	853	-290	-25.4
Other Cancers	7,240	5,427	-1,813	-25.0
Asthma	3,475	3,116	-359	-10.3
Diabetes	4,464	3,945	-519	-11.6
Hypertension	11,043	9,746	-1,297	-11.7
Heart Disease	4,125	3,062	-1,063	-25.8
Stroke	802	692	-110	-13.7
Emotional Disturbances	6,955	6,354	-601	-8.6
Total	42,758	35,862	-6,896	-16.1

Source: Milken Institute

The *cumulative* difference between the baseline and optimistic projections based on GDP is $6.9 trillion. For wage-based projections, the cumulative difference is $3.0 trillion.

Indirect impacts depend on the projections of future wages, GDP, and employment. In addition, projections of Population Reporting Condition (PRC) account for some variations. Differences in PRC forecasts (attributable to such factors as demographics, risk factors, and treatment advances) also account for some variations. In the following pages, we go through the projections by disease category.

CANCER

GDP: In 2003 the total indirect impacts based on GDP amounted to $271.2 billion. In 2023, the total indirect impact for the baseline scenario increased to $959.6 billion. For the optimistic scenario, the total is lower, at $586.5 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $373.0 billion, reflecting a difference of 38.9 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $2.9 trillion.

Wages: Total indirect impacts based on wages in 2003 amounted to $120.3 billion. In 2023, the sum increases to $413.4 billion in the baseline projection and $252.7 billion in the optimistic scenario.

GDP-Based Indirect Impact Projections for Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	13.8	13.8	233.7	233.7	1.0	1.0	22.7	22.7	271.2	271.2
2023	48.9	40.0	827.1	491.6	3.5	2.9	80.0	52.0	959.6	586.5
Percent Change 2003-2023	254.0	189.3	254.0	110.4	252.7	188.0	252.7	129.4	253.9	116.3

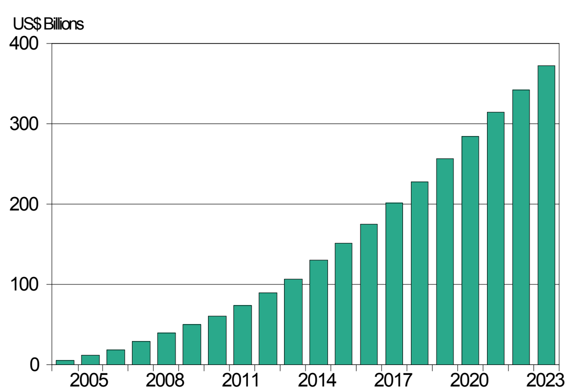
Source: Milken Institute

Wage-Based Indirect Impact Projections for Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	6.1	6.1	103.7	103.7	0.4	0.4	10.1	10.1	120.3	120.3
2023	21.0	17.2	356.4	211.8	1.5	1.2	34.5	22.4	413.4	252.7
Percent Change 2003-2023	243.6	180.9	243.6	104.2	242.4	176.9	242.4	122.6	243.5	110.0

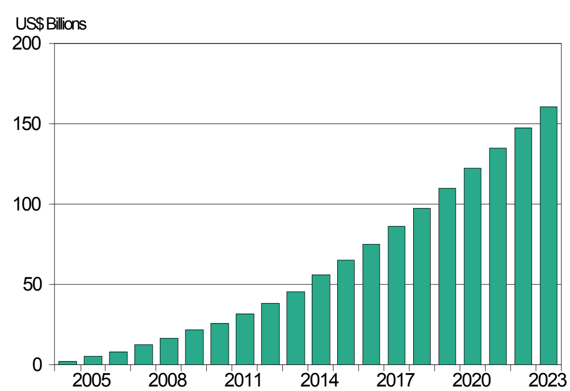
Source: Milken Institute

Cancer
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Cancer
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

BREAST CANCER

GDP: In 2003 the total indirect impacts based on GDP amounted to $31.1 billion. In 2023, the baseline scenario increases to $102.2 billion; the difference in the optimistic scenario increases to $66.6 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $36.0 billion, reflecting a difference of 35.1 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $281.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $13.8 billion. In 2023, the total increases to $44.0 billion in the baseline projection and $28.7 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Breast Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	1.6	1.6	26.8	26.8	0.1	0.1	2.6	2.6	31.1	31.1
2023	5.2	4.5	88.1	55.8	0.4	0.3	8.5	5.9	102.2	66.6
Percent Change 2003-2023	228.1	186.1	228.1	108.0	226.9	185.1	226.9	126.8	228.0	113.9

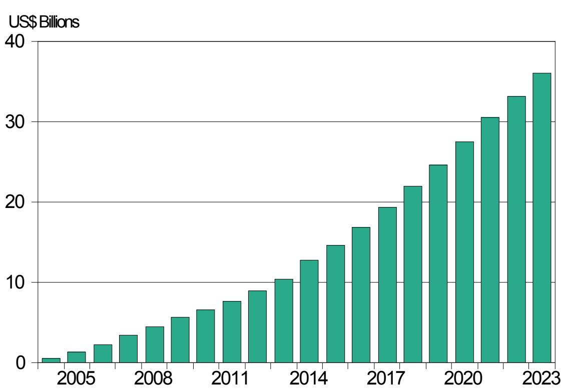
Source: Milken Institute

Wage-Based Indirect Impact Projections for Breast Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	0.7	0.7	11.9	11.9	0.1	0.1	1.2	1.2	13.8	13.8
2023	2.2	2.0	38.0	24.1	0.2	0.1	3.7	2.5	44.0	28.7
Percent Change 2003-2023	222.3	180.5	218.6	102.0	217.4	173.9	216.4	119.0	218.5	107.7

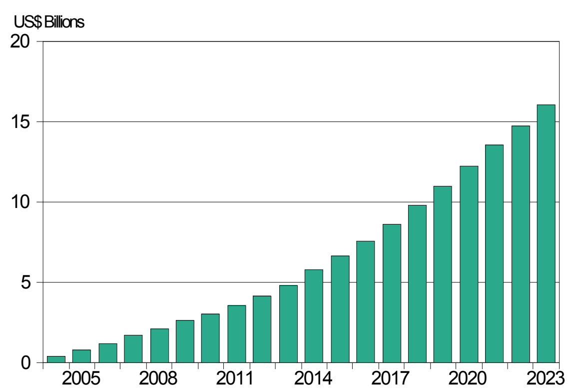
Source: Milken Institute

Breast Cancer
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Breast Cancer
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

COLON CANCER

GDP: In 2003 the total indirect impacts based on GDP amounted to $22.1 billion. In 2023, the baseline scenario increases to $69.8 billion; the optimistic scenario increases to $42.7 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $27.0 billion, reflecting a difference of 38.8 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $224.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $9.8 billion. In 2023, the total increases to $30.1 billion in the baseline projection and $18.4 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Colon Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	1.1	1.1	19.0	19.0	0.1	0.1	1.8	1.8	22.1	22.1
2023	3.6	2.9	60.2	35.8	0.3	0.2	5.8	3.8	69.8	42.7
Percent Change 2003-2023	216.0	158.5	216.0	88.0	214.9	157.6	214.9	105.0	215.9	93.3

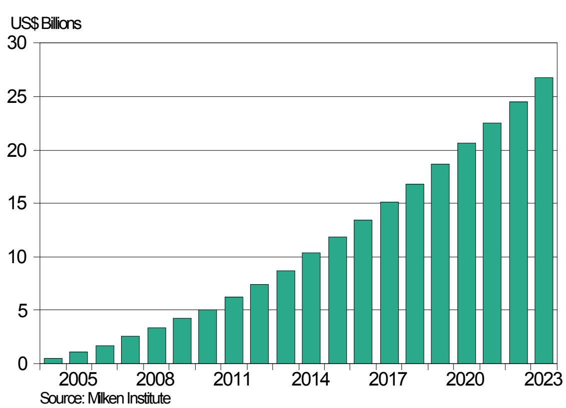
Source: Milken Institute

Wage-Based Indirect Impact Projections for Colon Cancer - US$ Billions

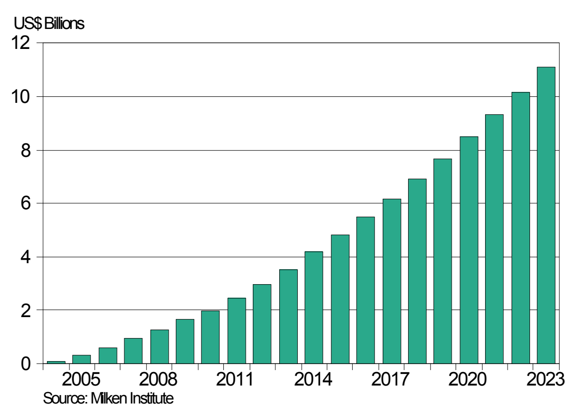
	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	0.5	0.5	8.5	8.5	0.0	0.0	0.8	0.8	9.8	9.8
2023	1.5	1.3	25.9	15.4	0.1	0.1	2.5	1.6	30.1	18.4
Percent Change 2003-2023	206.0	150.0	206.9	82.5	205.7	151.1	206.1	98.8	206.5	87.6

Source: Milken Institute

Colon Cancer
GDP-Based Avoidable Indirect Impact



Colon Cancer
Wage-Based Avoidable Indirect Impact



LUNG CANCER

GDP: In 2003 the total indirect impacts based on GDP amounted to $35.7 billion. In 2023, the baseline scenario increases to $105.5 billion; the optimistic scenario increases to $63.9 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $42.0 billion, reflecting a difference of 39.8 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $339.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $15.8 billion. In 2023, the total increases to $45.4 billion in the baseline projection and $27.5 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Lung Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	1.8	1.8	30.8	30.8	0.1	0.1	3.0	3.0	35.7	35.7
2023	5.4	4.4	90.9	53.6	0.4	0.3	8.8	5.7	105.5	63.9
Percent Change 2003-2023	195.5	139.4	195.5	74.1	194.5	138.6	194.5	89.8	195.4	79.0

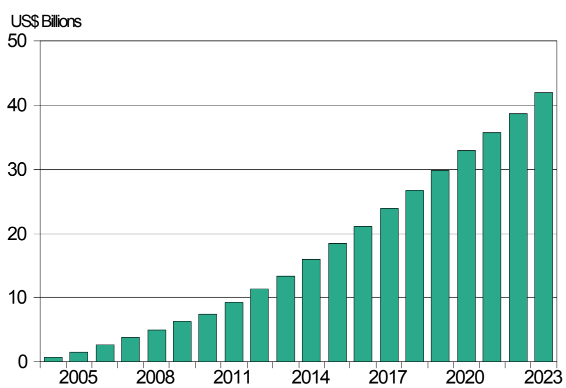
Source: Milken Institute

Wage-Based Indirect Impact Projections for Lung Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	0.8	0.8	13.7	13.7	0.1	0.1	1.3	1.3	15.8	15.8
2023	2.3	1.9	39.2	23.1	0.2	0.1	3.8	2.4	45.4	27.5
Percent Change 2003-2023	185.2	130.9	187.0	69.1	193.4	124.4	187.1	84.8	186.9	73.7

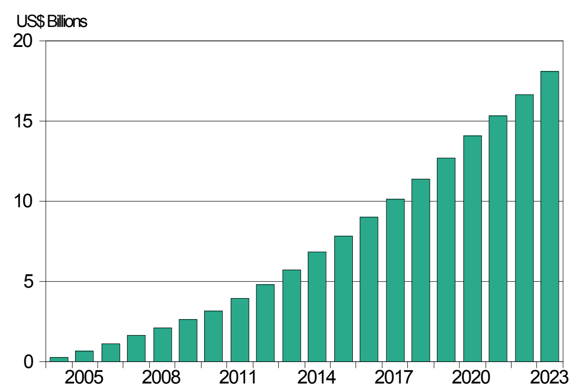
Source: Milken Institute

Lung Cancer
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Lung Cancer
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

PROSTATE CANCER

GDP: In 2003 the total indirect impacts based on GDP amounted to $24.1 billion. In 2023, the baseline scenario increases to $93.5 billion; the optimistic scenario increases to $54.6 billion. Also in 2023, the difference between the scenarios comes to $39.0 billion, reflecting a difference of 42.1 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $290.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $10.7 billion. In 2023, the total increases to $40.3 billion in the baseline projection and $23.5 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Prostate Cancer - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	1.2	1.2	20.8	20.8	0.1	0.1	2.0	2.0	24.1	24.1
2023	4.8	3.7	80.6	45.7	0.3	0.3	7.8	4.8	93.5	54.6
Percent Change 2003-2023	287.5	202.6	287.5	120.1	286.1	201.5	286.1	139.9	287.4	126.2

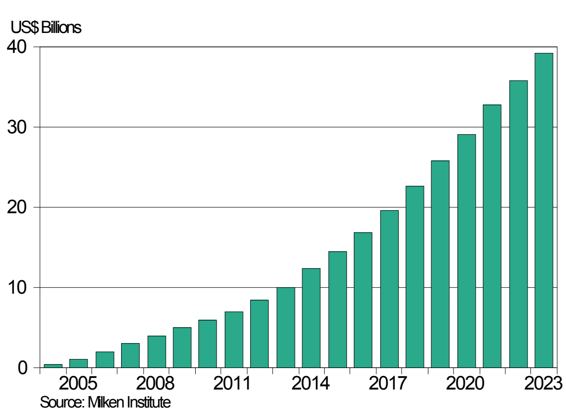
Source: Milken Institute

Wage-Based Indirect Impact Projections for Prostate Cancer - US$ Billions

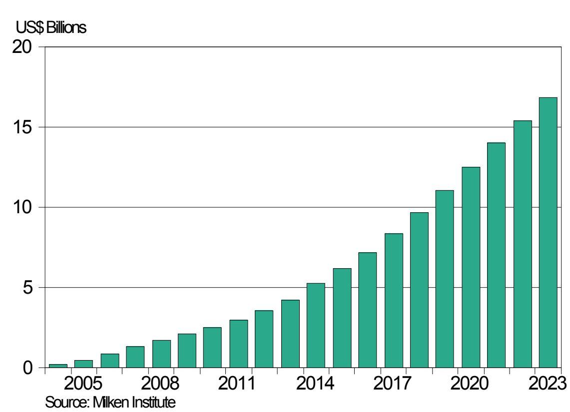
	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	0.5	0.5	9.2	9.2	0.0	0.0	0.9	0.9	10.7	10.7
2023	2.1	1.6	34.7	19.7	0.1	0.1	3.4	2.1	40.3	23.5
Percent Change 2003-2023	281.5	197.7	276.1	113.5	274.9	181.6	273.3	131.1	275.9	119.5

Source: Milken Institute

Prostate Cancer
GDP-Based Avoidable Indirect Impact



Prostate Cancer
Wage-Based Avoidable Indirect Impact



OTHER CANCERS

GDP: In 2003 the total indirect impacts based on GDP amounted to $158.1 billion. In 2023, the baseline scenario increases to $588.7 billion; the optimistic scenario increases to $358.7 billion. Also in 2023, the difference between the scenarios comes to $230.0 billion, reflecting a difference of 38.9 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $1.8 trillion.

Wages: Total indirect impacts based on wages in 2003 amounted to $70.2 billion. In 2023, the total increases to $253.6 billion in the baseline projection and $154.5 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Other Cancers - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	8.1	8.1	136.2	136.2	0.6	0.6	13.2	13.2	158.1	158.1
2023	30.0	24.5	507.4	300.7	2.2	1.8	49.1	31.8	588.7	358.7
Percent Change 2003-2023	272.5	203.5	272.5	120.7	271.1	202.4	271.1	140.7	272.3	126.9

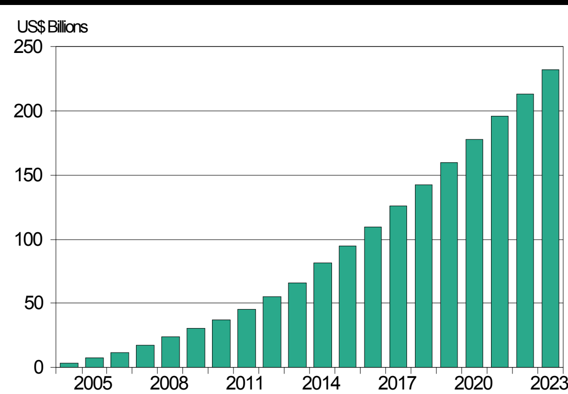
Source: Milken Institute

Wage-Based Indirect Impact Projections for Other Cancers - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	3.6	3.6	60.5	60.5	0.3	0.3	5.9	5.9	70.2	70.2
2023	12.9	10.5	218.8	129.6	0.9	0.8	21.1	13.7	253.6	154.5
Percent Change 2003-2023	261.3	194.4	261.9	114.3	260.3	189.2	260.1	133.4	261.5	120.3

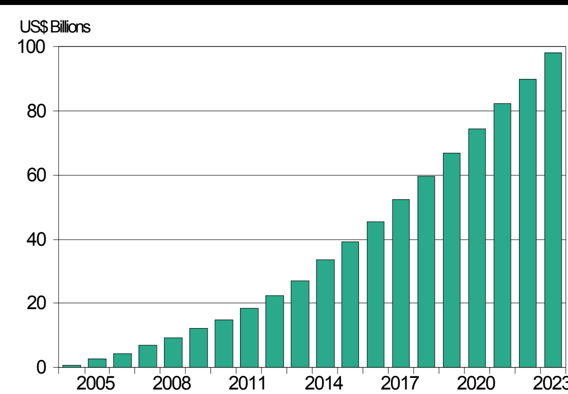
Source: Milken Institute

Other Cancers
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Other Cancers
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

ASTHMA

GDP: In 2003 the total indirect impacts based on GDP amounted to $93.7 billion. In 2023, the baseline scenario increases to $265.4 billion; the optimistic scenario increases to $218.3 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $47.0 billion, reflecting a difference of 17.7 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $359.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $41.6 billion. In 2023, the total increases to $114.3 billion in the baseline projection and $94.1 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Asthma - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	18.8	18.8	67.0	67.0	1.4	1.4	6.5	6.5	93.7	93.7
2023	53.3	45.8	189.8	154.2	3.9	3.3	18.4	15.0	265.4	218.3
Percent Change 2003-2023	183.4	143.5	183.4	130.2	182.7	143.3	183.2	130.1	183.3	133.1

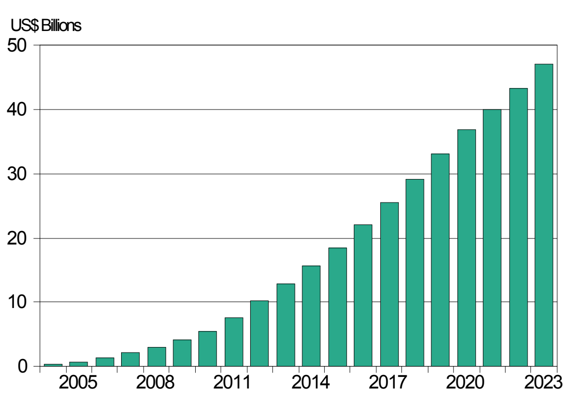
Source: Milken Institute

Wage-Based Indirect Impact Projections for Asthma - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	8.3	8.3	29.7	29.7	0.6	0.6	2.9	2.9	41.6	41.6
2023	22.9	19.7	81.8	66.5	1.7	1.4	7.9	6.5	114.3	94.1
Percent Change 2003-2023	175.1	136.4	175.1	123.5	174.9	136.2	174.9	123.3	175.0	126.3

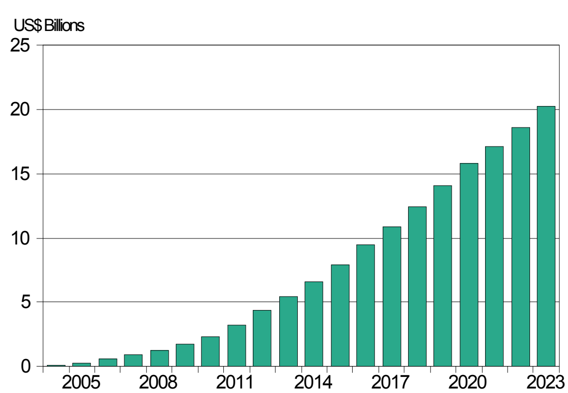
Source: Milken Institute

Asthma
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Asthma
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

DIABETES

GDP: In 2003 the total indirect impacts based on GDP amounted to $104.7 billion. In 2023, the baseline scenario increases to $350.1 billion; the optimistic scenario increases to $277.5 billion. Also in 2023, the difference between the scenarios comes to $73.0 billion, reflecting a difference of 20.8 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $519.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $46.5 billion. In 2023, the total increases to $150.7 billion in the baseline projection and $119.5 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Diabetes - US$ Billions

	Individual				Caregiver					
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism		Total	
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	10.4	10.4	85.3	85.3	0.8	0.8	8.3	8.3	104.7	104.7
2023	34.6	30.0	282.6	221.6	2.8	2.4	30.1	23.4	350.1	277.5
Percent Change 2003-2023	231.4	187.3	231.4	159.9	264.0	213.3	264.5	183.4	234.3	164.9

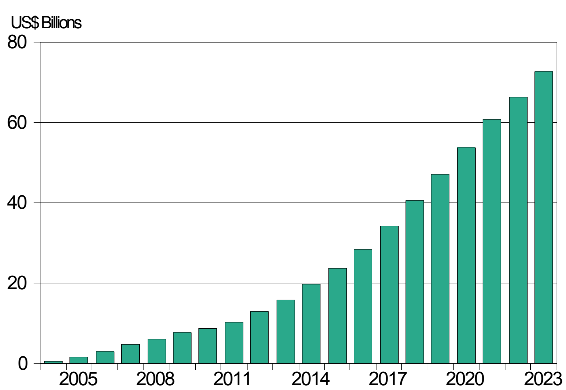
Source: Milken Institute

Wage-Based Indirect Impact Projections for Diabetes - US$ Billions

	Individual				Caregiver					
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism		Total	
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	4.6	4.6	37.8	37.8	0.3	0.3	3.7	3.7	46.5	46.5
2023	14.9	12.9	121.7	95.4	1.2	1.0	13.0	10.1	150.7	119.5
Percent Change 2003-2023	221.7	179.0	221.7	152.3	254.0	204.2	254.0	175.1	224.5	157.2

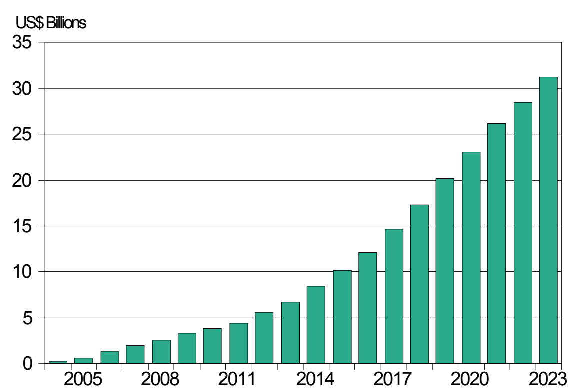
Source: Milken Institute

Diabetes
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Diabetes
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

HYPERTENSION

GDP: In 2003 the total indirect impacts based on GDP amounted to $279.5 billion. In 2023, the baseline scenario increases to $838.7 billion; the optimistic scenario increases to $666.3 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $172.0 billion, reflecting a difference of 20.6 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $1.3 trillion.

Wages: Total avoidable indirect impacts based on wages in 2003 amounted to $123.6 billion. In 2023, the total increases to $360.2 billion in the baseline projection and $286.1 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Hypertension - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	41.1	41.1	213.6	213.6	4.1	4.1	20.7	20.7	279.5	279.5
2023	123.4	100.3	641.0	506.9	12.1	9.9	62.2	49.2	838.7	666.3
Percent Change 2003-2023	200.1	144.0	200.1	137.3	199.4	143.6	199.7	137.0	200.0	138.4

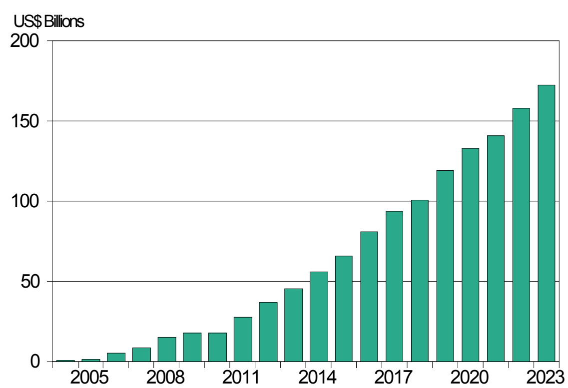
Source: Milken Institute

Wage-Based Indirect Impact Projections for Hypertension - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	18.2	18.2	94.5	94.5	1.8	1.8	9.2	9.2	123.6	123.6
2023	53.0	43.1	275.2	217.7	5.2	4.2	26.7	21.1	360.2	286.1
Percent Change 2003-2023	191.3	136.9	191.3	130.4	190.9	136.5	190.9	130.1	191.3	131.4

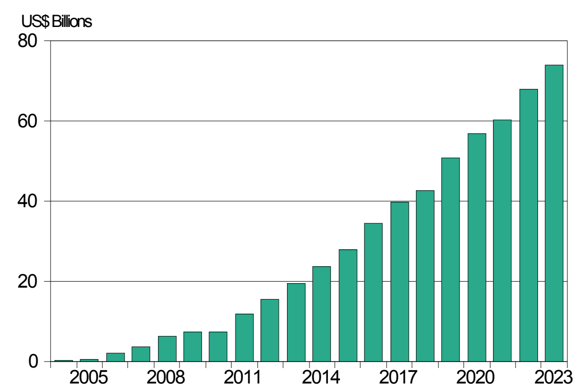
Source: Milken Institute

Hypertension
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Hypertension
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

HEART DISEASE

GDP: In 2003 the total indirect impacts based on GDP amounted to $104.6 billion. In 2023, the baseline scenario increases to $318.9 billion; the optimistic scenario increases to $181.7 billion. Also in 2023, the difference between baseline and optimistic scenarios themselves comes to $137.0 billion, reflecting a difference of 43.0 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $1.1 trillion.

Wages: Total indirect impacts based on wages in 2003 amounted to $46.3 billion. In 2023, the total increases to $137.0 billion in the baseline projection and $78.1 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Heart Disease - US$ Billions

	Individual				Caregiver					
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism		Total	
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	20.6	20.6	74.8	74.8	2.0	2.0	7.2	7.2	104.6	104.6
2023	62.7	41.0	228.0	124.7	6.2	4.0	22.0	12.1	318.9	181.7
Percent Change 2003-2023	204.8	99.3	204.8	66.7	204.9	99.0	204.3	66.5	204.8	73.7

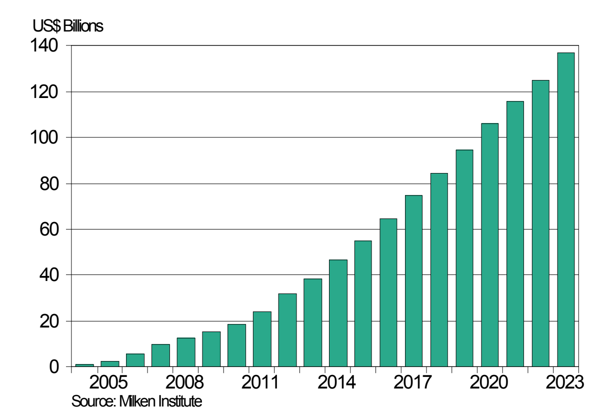
Source: Milken Institute

Wage-Based Indirect Impact Projections for Heart Disease - US$ Billions

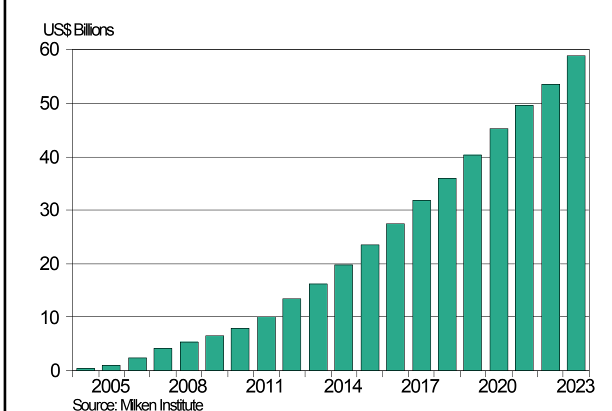
	Individual				Caregiver					
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism		Total	
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	9.1	9.1	33.1	33.1	0.9	0.9	3.2	3.2	46.3	46.3
2023	26.9	17.6	97.9	53.5	2.7	1.7	9.5	5.2	137.0	78.1
Percent Change 2003-2023	195.9	93.4	195.9	61.8	195.5	93.2	195.5	61.6	195.9	68.6

Source: Milken Institute

Heart Disease
GDP-Based Avoidable Indirect Impact



Heart Disease
Wage-Based Avoidable Indirect Impact



STROKE

GDP: In 2003 the total indirect impacts based on GDP amounted to $22.1 billion. In 2023, the baseline scenario increases to $61.4 billion; the optimistic scenario increases to $47.1 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $14.0 billion, reflecting a difference of 23.4 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $110.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $9.8 billion. In 2023, the total increases to $26.3 billion in the baseline projection and $20.2 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Stroke - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	3.8	3.8	16.5	16.5	0.3	0.3	1.6	1.6	22.1	22.1
2023	10.5	8.5	45.7	34.6	0.8	0.6	4.5	3.4	61.4	47.1
Percent Change 2003-2023	177.3	125.3	177.6	110.0	182.1	125.2	176.8	109.8	177.6	112.8

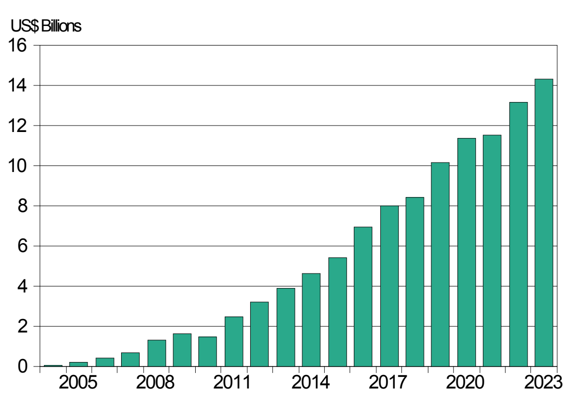
Source: Milken Institute

Wage-Based Indirect Impact Projections for Stroke - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	1.7	1.7	7.3	7.3	0.1	0.1	0.7	0.7	9.8	9.8
2023	4.5	3.7	19.6	14.8	0.3	0.3	1.9	1.4	26.3	20.2
Percent Change 2003-2023	169.5	118.7	169.5	103.8	169.4	118.6	169.4	103.7	169.5	106.6

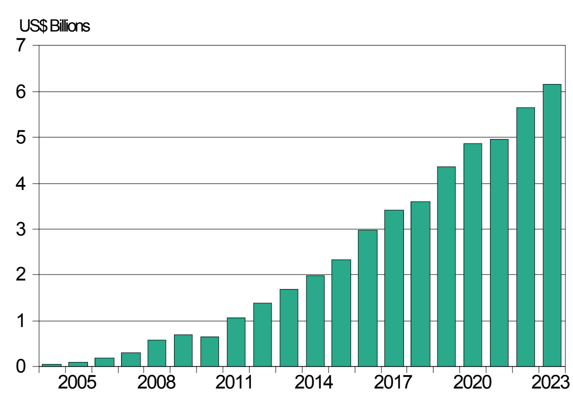
Source: Milken Institute

Stroke
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Stroke
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

EMOTIONAL DISTURBANCES

GDP: In 2003 the total indirect impacts based on GDP amounted to $170.9 billion. In 2023, the baseline scenario increases to $568.5 billion; the optimistic scenario increases to $480.2 billion. Also in 2023, the difference between the baseline and optimistic scenarios themselves comes to $88.0 billion, reflecting a difference of 15.5 percent.

The cumulative avoidable indirect impact based on GDP over the twenty-year period is $601.0 billion.

Wages: Total indirect impacts based on wages in 2003 amounted to $76.0 billion. In 2023, the total increases to $245.3 billion in the baseline projection and $207.2 billion for the optimistic scenario.

GDP-Based Indirect Impact Projections for Emotional Disturbances - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	18.9	18.9	137.4	137.4	1.4	1.4	13.2	13.2	170.9	170.9
2023	62.8	55.1	457.2	384.2	4.6	4.0	43.9	36.9	568.5	480.2
Percent Change 2003-2023	232.6	191.5	232.7	179.6	232.9	191.2	232.3	179.3	232.7	181.0

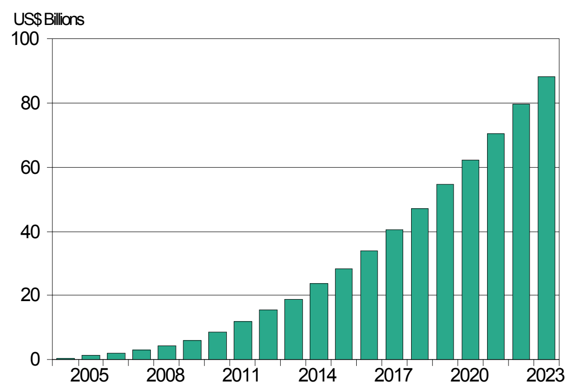
Source: Milken Institute

Wage-Based Indirect Impact Projections for Emotional Disturbances - US$ Billions

	Individual				Caregiver				Total	
	Lost Workdays		Presenteeism		Lost Workdays		Presenteeism			
Year	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic
2003	8.4	8.4	61.1	61.1	0.6	0.6	5.9	5.9	76.0	76.0
2023	27.0	23.7	197.4	165.9	2.0	1.7	18.9	15.9	245.3	207.2
Percent Change 2003-2023	223.0	183.0	223.0	171.4	222.5	182.7	222.5	171.1	223.0	172.8

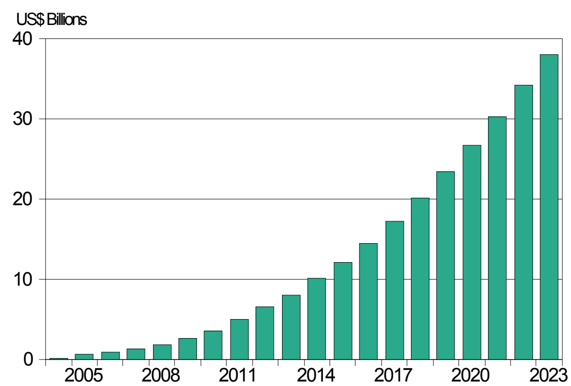
Source: Milken Institute

Emotional Disturbances
GDP-Based Avoidable Indirect Impact



Source: Milken Institute

Emotional Disturbances
Wage-Based Avoidable Indirect Impact



Source: Milken Institute

State-Level Avoidable Indirect Impacts

Although every disease category is projected to cause a rise in avoidable direct impacts—the economic toll of lost workdays and lowered productivity—the state rankings experience no change due to those impacts over the period 2003–2023. In general, a state's score depends on the relative distribution of future GDP or wage rates, its employed population, and disease-specific PRC totals, which cause most of the variation between baseline and optimistic scenarios.

When a state ranks high for disease-specific indirect impacts despite having a low PRC, the ranking is attributable to high GDP or wage rates. The following table depicts states that rank at the top and bottom of per capita projected GDP and wage rates in 2023.

Projections of GDP and Wages - Per Capita, 2023

Top 5 States		Bottom 5 States	
GDP	Wages	GDP	Wages
Delaware	Colorado	West Virginia	Montana
Connecticut	Nevada	Montana	West Virginia
Massachusetts	Delaware	Mississippi	Mississippi
New York	Connecticut	Oklahoma	Louisiana
California	Washington	Arkansas	Oklahoma

Sources: U.S. Census, Economy.com

When a state ranks low for disease-specific indirect impacts despite having a high PRC, the ranking is attributable to low projected GDP or wage rates. Again, the net effect depends on the relative strength of GDP or wage rates, and PRC.

Projections of the labor force size will also influence avoidable indirect impacts and some variations among state rankings.

Employment and Population - Projected Rankings, 2023

Top 5 States		Bottom 5 States	
Employment	Population	Employment	Population
California	California	Wyoming	Wyoming
Texas	Texas	Vermont	North Dakota
Florida	Florida	Alaska	Vermont
New York	New York	North Dakota	Alaska
Illinois	Illinois	South Dakota	South Dakota

Sources: U.S. Census, Economy.com

In the following paragraphs, we examine where specific diseases are projected to have the largest—and lowest—avoidable indirect impacts across states. We only show the GDP-based indirect impacts; wage-based impacts are similar and not included here.

CANCER

In terms of 2003 indirect impacts, the top five states were Arkansas, Tennessee, Mississippi, Kentucky, and Maryland. In 2023 both for the baseline and the optimistic projections, the top five states are Mississippi, Arkansas, Tennessee, Kentucky, and Maine. Maryland drops to 10th in 2023, and Maine move up from 10th in 2003.

For both projections of bottom five states, we also see identical rankings for the 2023 baseline and optimistic scenarios: Arizona, Utah, Hawaii, New Mexico, and Kansas.

GDP-Based Indirect Impact Per Capita for Cancer, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Mississippi	Mississippi	Arizona	Arizona
Arkansas	Arkansas	Utah	Utah
Tennessee	Tennessee	Hawaii	Hawaii
Kentucky	Kentucky	New Mexico	New Mexico
Maine	Maine	Kansas	Kansas

Source: Milken Institute

BREAST CANCER

Trends in the data continue to show the highest indirect impact per capita for breast cancer remaining in the New England states.

In 2003 calculations, the top five states were Connecticut, New Hampshire, New Jersey, Vermont, and Massachusetts. In 2023, for the top five states, again in both scenarios, the rankings change to include Vermont (up from 4th in 2003) and Maine (up from 7th in 2003). For both scenarios in 2023, the bottom five states include Arizona, South Dakota, Utah, Missouri, and North Dakota.

GDP-Based Indirect Impact Per Capita for Breast Cancer, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Vermont	Vermont	Arizona	Arizona
New Hampshire	New Hampshire	South Dakota	South Dakota
Maine	Maine	Utah	Utah
Connecticut	Connecticut	Missouri	Missouri
New Jersey	New Jersey	North Dakota	North Dakota

Source: Milken Institute

LUNG CANCER

In 2003 calculations, the top five states were Kentucky, Nevada, Tennessee, West Virginia, and Oklahoma. In 2023, for the top five states, again in both scenarios, the rankings change to include Wyoming (up from 6th in 2003) but exclude Oklahoma, which falls to 6th.

For both scenarios in 2023, the bottom five states include Utah, North Dakota, Nebraska, Minnesota, and Kansas.

GDP-Based Indirect Impact Per Capita for Lung Cancer, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Kentucky	Kentucky	Utah	Utah
Nevada	Nevada	North Dakota	North Dakota
Tennessee	Tennessee	Nebraska	Nebraska
Wyoming	Wyoming	Minnesota	Minnesota
West Virginia	West Virginia	Kansas	Kansas

Source: Milken Institute

COLON CANCER

In 2003 calculations, the top five states are Wyoming, West Virginia, Louisiana, Hawaii, and Arkansas. In 2023, for the top five states, again in both scenarios, the rankings change to include Alaska (up from 9th in 2003). West Virginia falls from 2nd in 2003.

For both scenarios in 2023, bottom five states include Kansas, Minnesota, Wisconsin, Ohio, and Michigan.

GDP-Based Indirect Impact Per Capita for Colon Cancer, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Wyoming	Wyoming	Kansas	Kansas
Alaska	Alaska	Minnesota	Minnesota
West Virginia	West Virginia	Wisconsin	Wisconsin
Louisiana	Louisiana	Ohio	Ohio
Hawaii	Hawaii	Michigan	Michigan

Source: Milken Institute

PROSTATE CANCER

In 2003 calculations, the top five states were New Jersey, Mississippi, Arkansas, Connecticut, and Rhode Island. In 2023, for the top five states, again in both scenarios, the rankings change to include New Hampshire (up from 6th in 2003), Vermont (up from 12th in 2003), and Maine (up from 14th in 2023).

For both scenarios in 2023, bottom five states include Arizona, Hawaii, Missouri, Indiana, and Texas.

GDP-Based Indirect Impact Per Capita for Prostate Cancer, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
New Jersey	New Jersey	Arizona	Arizona
Mississippi	Mississippi	Hawaii	Hawaii
New Hampshire	New Hampshire	Missouri	Missouri
Vermont	Vermont	Indiana	Indiana
Maine	Maine	Texas	Texas

Source: Milken Institute

OTHER CANCERS

In 2003 calculations, the top five states were Arkansas, Mississippi, Tennessee, Maryland, and Delaware. In 2023, for the top five states, again in both scenarios, the rankings change to include Kentucky (up from 6th in 2003) and West Virginia (up from 8th in 2003).

For both scenarios in 2023, bottom five states include Arizona, Hawaii, Utah, New Mexico, and California.

GDP-Based Indirect Impact Per Capita for Other Cancers, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Mississippi	Mississippi	Arizona	Arizona
Arkansas	Arkansas	Hawaii	Hawaii
Tennessee	Tennessee	Utah	Utah
Kentucky	Kentucky	New Mexico	New Mexico
West Virginia	West Virginia	California	California

Source: Milken Institute

ASTHMA

In 2003 calculations, the top five states were Kentucky, Michigan, Maine, Massachusetts, and West Virginia.

The top five states in both scenarios in 2023 remain the same. Kentucky experiences the highest impact, followed by Maine, West Virginia, Michigan, and Massachusetts. Among the bottom five states for 2023, Hawaii has the lowest impact over the same period, followed by Nevada, New Mexico, Utah, and Wyoming.

GDP-Based Indirect Impact Per Capita for Asthma, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Kentucky	Kentucky	Hawaii	Hawaii
Maine	Maine	Nevada	Nevada
West Virginia	West Virginia	New Mexico	New Mexico
Michigan	Michigan	Utah	Utah
Massachusetts	Massachusetts	Wyoming	Wyoming

Source: Milken Institute

DIABETES

In 2003 calculations, the top five states in were Mississippi, West Virginia, Tennessee, South Carolina, and Pennsylvania.

In both 2003 and 2023, Mississippi tops the list with the highest indirect impacts. In 2023, Tennessee moves down to the 6th position, (from 3rd in 2003) for both scenarios. Colorado has the lowest indirect impact in 2003 and in both scenarios in 2023.

GDP-Based Indirect Impact Per Capita for Diabetes, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Mississippi	Mississippi	Colorado	Colorado
Maine	Maine	Alaska	Alaska
West Virginia	West Virginia	Minnesota	Minnesota
South Carolina	South Carolina	Kansas	Kansas
Pennsylvania	Pennsylvania	Wisconsin	Wisconsin

Source: Milken Institute

HYPERTENSION

In 2003 calculations, the top five states were West Virginia, Mississippi, Alabama, Arkansas, and Tennessee.

The 2023 data show that state rankings for PRC hypertension match the projected state rankings for indirect impacts. Mississippi, West Virginia, Alabama, Florida, and Arkansas are the top five states; and Utah, Colorado, Alaska, Hawaii (seventh lowest in 2003), and Montana are the bottom five states for indirect impacts.

GDP-Based Indirect Impact Per Capita for Hypertension, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Mississippi	Mississippi	Utah	Utah
West Virginia	West Virginia	Colorado	Colorado
Alabama	Alabama	Alaska	Alaska
Florida	Florida	Hawaii	Hawaii
Arkansas	Arkansas	Montana	Montana

Source: Milken Institute

HEART DISEASE

In 2003 calculations, the top five states were West Virginia, Oklahoma, Mississippi, Alabama, and Pennsylvania.

In 2023 for both optimistic and baseline scenarios, West Virginia ranks first, followed by Mississippi, Alabama, Oklahoma, and Florida. This ranking order matches the states' 2023 PRC rankings. For 2023, bottom five states are Utah (down from second lowest), Alaska, Colorado, Minnesota, and Oregon (38th in 2003). This order matches the PRC rankings for the bottom five states in 2023.

GDP-Based Indirect Impact Per Capita for Heart Disease, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
West Virginia	West Virginia	Utah	Utah
Mississippi	Mississippi	Alaska	Alaska
Alabama	Alabama	Colorado	Colorado
Oklahoma	Oklahoma	Minnesota	Minnesota
Florida	Florida	Oregon	Oregon

Source: Milken Institute

STROKE

In 2003 calculations, the top five states were North Dakota, West Virginia, Iowa, Maine, and Arkansas.

In 2023 for both scenarios, the top five states are North Dakota, West Virginia, Iowa, Maine, and Arkansas. Utah, Alaska, New York, Colorado, and Nevada are the bottom five states for indirect impacts.

GDP-Based Indirect Impact Per Capita for Stroke, 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
North Dakota	North Dakota	Utah	Utah
West Virginia	West Virginia	Alaska	Alaska
Iowa	Iowa	New York	New York
Maine	Maine	Colorado	Colorado
Arkansas	Arkansas	Nevada	Nevada

Source: Milken Institute

EMOTIONAL DISTURBANCES

In 2003 calculations, the top five states were Oregon, Massachusetts, Montana, Wisconsin, and Minnesota.

Oregon, Massachusetts, Montana, Vermont (up from 6th in 2003), and New Mexico maintain their positions in both scenarios in 2023.

The bottom five states in both 2003 and 2023 are Washington, North Dakota, California, New York, and Mississippi. The rankings are identical to the projections of PRC for 2023.

GDP-Based Indirect Impact Per Capita for Emotional Disturbances 2023

Top 5 States		Bottom 5 States	
Baseline	**Optimistic**	**Baseline**	**Optimistic**
Oregon	Oregon	Washington	Washington
Massachusetts	Massachusetts	North Dakota	North Dakota
Montana	Montana	California	California
Vermont	Vermont	New York	New York
New Mexico	New Mexico	Mississippi	Mississippi

Source: Milken Institute

Two Examples of the Impacts of Key Behavioral Risk Factors

Over the past quarter century, Americans have grown more aware of the links between healthy living and long-term health. Yet we nonetheless face several preventable "epidemics" that threaten to overwhelm the health-care system and result in catastrophic losses to U.S. GDP.

Obesity (and its links to diabetes, hypertension, and other chronic diseases) and smoking are the most dangerous risk factors. Lower obesity rates could result in a savings of $59.7 billion in treatment costs. The productivity gains between business-as-usual (our baseline scenarios) and improved behaviors (the optimistic scenarios) come to another $253.9 billion. In terms of smoking-related conditions, we find that if the current health trends continue, the country stands to lose as much as $110.4 billion by 2023. The following charts look at our projections of cases, costs, and diminished economic returns due to lost workdays and lowered productivity.

2023 Projected Differences Due to Obesity - Changes Relative to Baseline

	PRC	Total Expenditure		Total Indirect Impact*	
Chronic Disease	Absolute (Thousands)	Absolute (US$ Billions)	Percent	Absolute (US$ Billions)	Percent
Cancer	-1,800	-12.4	-11.4	-72.2	-12.1
Breast Cancer	-211	-1.7	-12.3	-9.4	-12.4
Colon Cancer	-19	-0.4	-4.8	-2.2	-4.9
Prostate Cancer	-393	-2.8	-21.5	-14.9	-21.4
Other Cancers	-1,178	-7.5	-10.2	-45.7	-11.3
Diabetes	-2,791	-9.6	-13.3	-42.8	-13.4
Heart Disease	-4,429	-27.6	-20.0	-45.6	-20.0
Hypertension	-5,690	-8.9	-12.0	-91.2	-12.0
Stroke	-112	-1.2	-4.2	-2.1	-4.2
Total	-14,824	-59.7	-14.2	-253.9	-13.0

* Based on Nominal GDP

2023 Disease Difference Due to Smoking - Changes Relative to Baseline

	PRC	Total Expenditure		Total Indirect Impact*	
Chronic Disease	Absolute (Thousands)	Absolute (US$ Billions)	Percent	Absolute (US$ Billions)	Percent
Cancer	-615	-6.7	-7.2	-29.3	-5.9
Colon Cancer	-47	-1.0	-11.4	-4.1	-8.8
Lung Cancer	-91	-2.7	-18.4	-12.3	-16.1
Other Cancers	-477	-3.0	-4.4	-12.9	-3.5
Heart Disease	-1,352	-8.4	-7.1	-13.9	-7.1
Pulmonary Conditions**	-7,256	-12.0	-11.6	-28.5	-11.6
Stroke	-393	-4.2	-13.4	-7.3	-13.4
Total	-9,617	-31.4	-9.0	-79.0	-8.0

* Based on Nominal GDP
** Only Asthma for Indirect Impact

In the course of this study, we have built numerous models to simulate the effects of prevention, screening, and treatment of chronic disease, not just in today's numbers, but in a series of projections spanning decades outward for all fifty states. We have also introduced a model that offers a powerful demonstration of the ways in which health can influence—both positively and negatively—overall economic growth.

V: Long-Term Forgone Economic Growth and Intergenerational Impacts

A. Introduction

While the indirect impacts of chronic disease, reflected in lost workdays, disability, and reduced employee productivity, are substantial, the intergenerational impacts on economic growth are likely to be much greater. Yet there has been little research to quantify the long-term effects of poor health on human and physical capital formation, or the restrictions imposed on U.S. economic growth.

Since the early 1990s, the determinants of economic growth have been the subject of renewed study. Most of the explanations fall under the umbrella of the "endogenous growth" theory. This theory is based on the observation that the factors that influence economic performance are determined within the model and interact with one other.[87] Other variables and model specifications have been attempted, but only a few endogenous models have been found to be statistically significant in explaining growth.[88]

Human capital is recognized as an important component of growth, but researchers have only recently begun to examine the role of health as another component. As a result, we are now seeing greater interplay between the fields of health economics and macroeconomics, as well as a growing awareness of the endogenous relationships between health, human capital formation, and economic performance. Most of the research has been centered on infectious disease in developing economies. But in developed countries, where deaths from infectious and parasitic disease have given way to deaths from chronic and degenerative disease, the economic impacts have received less attention—partly because they have been harder to discern empirically.

Economic growth depends on the stock of human capital (a well-trained work force) and continued investments in education and work-based learning and training procedures. Economic Nobelist Gary Becker offers an insightful summation of the way knowledge drives innovation:

> "The continuing growth in per capita incomes of many countries during the nineteenth and twentieth centuries is partly due to the expansion of scientific and technical knowledge that raises the productivity of labor and other inputs in production. The increasing reliance of industry on sophisticated knowledge greatly enhances the value of education, technical schooling, on-the-job training, and other human capital."[89]

Improved health also leads to greater investment in education, resulting in higher levels of human capital. In turn, wealth increases, and a virtuous cycle of economic growth is born. But investing in health requires a broad-based

87. Romer, Paul. "Endogenous Technological Change. *Journal of Political Economy*." October. 1990, p. 71–102.
88. López-Casasnovas, Guillem, Berta Rivera, and Luis, Currais. "Health and Economic Growth: Findings and Policy Implications." (Cambridge: The MIT Press, 2005), 2.
89. Becker, Gary. *Human Capital and the Economy: Proceedings of the American Philosophical Society*, Vol. 135 No. 1 (March 1992) p. 85–92.

strategy. It means identifying at-risk populations in order to increase rates of prevention, screening, and treatment. An under-investment in health leads to an under-investment in human capital, capital stock (the amount of equipment, machinery, and buildings in the economy), lower economic growth, and reduced wealth.

In this section, we describe a set of models we use to produce long-term projections of gross domestic product under a baseline and optimistic scenarios. The first of these is a production function, which estimates how a number of variable inputs are converted to outputs of real, inflation-adjusted GDP. The second model is a set of reaction functions, which then builds in the productivity impacts on future generations. An innovation from our research is the recognition of the dynamic feedback between health and multiple independent variables over time. The leads and lags between improvements in health and its subsequent impact on investments in human and physical capital can't be fully captured in the production function alone, which does not account for interplay between variables.

The baseline GDP projections adopt the current trends in each of the variable inputs and are consistent with the baseline projections of chronic disease. The optimistic projections assume measurable improvements in disease prevention, screening, and treatment. The difference between baseline and optimistic state GDP will indicate the true intergenerational relationship—the endogenous relationship—between health and the investments we make in economic growth.

Because this investigation only examines conditions in the United States, it is not hindered by the wide institutional and systemic differences found in cross-national studies. We are able to control for state variations using a fixed-effects model for a production function. A complete methodology is available online at www.chronicdiseaseimpact.com.

We find that the cumulative difference between baseline and optimistic projections during the period 2003–2023 will total $8.2 trillion (in 2003 dollars). By 2050, the difference will grow to $101.5 trillion, also measured in 2003 dollars. We also calculate that the annual average real GDP growth between 2004 and 2050 will be 0.36 percent higher in the optimistic scenario than in the baseline.

B. Variable Inputs

The production function establishes relationships between health, education, and economic growth by estimating how a number of variable inputs are converted to outputs of real, inflation-adjusted GDP. The variable inputs are: (1) life expectancy at 65; (2) labor force size; (3) capital stock; (4) adult population with a bachelor's degree or greater; and (5) young dependents per capita. To build the production function, we use historical data to build a balanced data set and control for state variations. Each of the variable inputs is described in more detail below:

(1) Life Expectancy at 65

Recent research has pointed to the relationship between life expectancy change and economic productivity. For example, a one-year change in life expectancy at birth can lead to a 4 percent boost in productivity.[90]

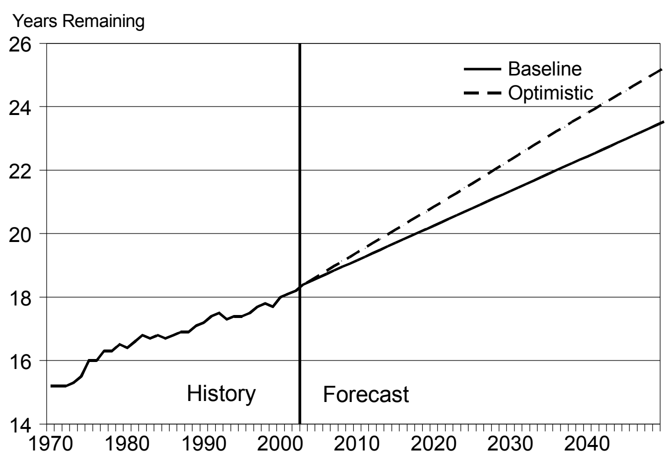
Life expectancy is a significant and positive factor in a state's real GDP, as it measures the cumulative lifetime

90. Bloom, David E., David Canning, and Sevilla, Jaypee. "The Effect of Health on Economic Growth: A Production Function Approach." *World Development*, 2004; 32(1): 1–13. The productivity boost is consistent with established results, but one must consider the limitations of applying the results to a market like the United States.

investment in health. Because this variable captures the overall health investment in lifestyle and diet, it is particularly applicable to chronic disease. Better investments to health and lifestyle will result in greater sustained labor force numbers and higher workforce quality. Some statistical projections use life expectancy at birth, but this is generally used to proxy a country's health and poverty, and seems less appropriate for a leading economy. As a variable, life expectancy at 65 is not used as frequently as life expectancy at birth. This is because it has been more difficult to obtain. However, our research specifically presses for its use as a variable since chronic disease generally afflicts older populations. In terms of comparison between the two variables, it is more difficult to gain an extra year of life expectancy at age 65 than it is to gain a year of life expectancy at birth.

The following graph demonstrates the increase in life expectancy at 65, drawn from the complete life table publications of the National Center for Health Statistics (NCHS). The baseline forecast is conservative and assumes a continuation of historical trends. The optimistic forecast, however, is based on our estimates of projected PRC data from previous chapters. We expect medical technology to have especially significant positive impacts on heart disease, breast cancer, and diabetes; therefore, improvements to life expectancy at 65 will be greater than the baseline.

Life Expectancy at 65 - U.S. Baseline and Optimistic Projections



Sources: NCHS, Milken Institute

The historical and projected tables that follow detail the growth for life expectancy at 65. The top five states and the bottom five states are represented according to their rankings. In 2003, for example, Hawaii topped the list, with 21.03 years (21.03 years past age 65). This was followed by Florida, Minnesota, Connecticut, and Arizona. These states can be characterized by generally healthy lifestyles; several are known as travel and retirement destinations. The bottom five are Southern states and characterized by a greater prevalence of unhealthy behaviors.

Historical Life Expectancy at Age 65, 1970

Top 5 States	Years Remaining	Bottom 5 States	Years Remaining
Hawaii	16.23	Louisiana	14.43
Florida	16.07	Mississippi	14.63
Minnesota	15.73	Alabama	14.75
Connecticut	15.29	Kentucky	14.79
Arizona	15.50	West Virginia	14.46

Sources: NCHS, Milken Institute

Historical Life Expectancy at Age 65, 2003

Top 5 States	Years Remaining	Bottom 5 States	Years Remaining
Hawaii	21.03	Louisiana	17.12
Florida	19.74	Mississippi	17.12
Minnesota	19.53	Alabama	17.09
Connecticut	19.43	Kentucky	17.04
Arizona	19.36	West Virginia	16.90

Sources: NCHS, Milken Institute

Projected Life Expectancy at Age 65, 2023

Top 5 States	Baseline	Optimistic	Bottom 5 States	Baseline	Optimistic
Hawaii	23.00	24.32	Louisiana	18.72	19.80
Florida	21.59	22.83	Mississippi	18.72	19.80
Minnesota	21.36	22.59	Alabama	18.69	19.77
Connecticut	21.25	22.47	Kentucky	18.63	19.71
Arizona	21.17	22.39	West Virginia	18.48	19.55

Sources: NCHS, Milken Institute

Projected Life Expectancy at Age 65, 2050

Top 5 States	Baseline	Optimistic	Bottom 5 States	Baseline	Optimistic
Hawaii	26.30	28.83	Louisiana	21.41	23.47
Florida	24.68	27.06	Mississippi	21.41	23.47
Minnesota	24.42	26.77	Alabama	21.37	23.43
Connecticut	24.29	26.64	Kentucky	21.31	23.36
Arizona	24.21	26.54	West Virginia	21.13	23.17

Sources: NCHS, Milken Institute

(2) Labor Force Size

Economic growth is strongly dictated by labor force numbers. With immigration (and longevity) on the rise, we expect to see a continual increase in these numbers.

The Census Bureau expects the labor force growth rate to decrease due to the aging population. But this assumption ignores the overall effects of improved health on the economy: healthier workers stay in the labor force longer. They achieve higher productivity. Their higher household incomes in turn influence education and health levels of successive generations.

(3) Capital Stock

Capital stock, also known as physical capital (the amount of equipment, machinery, and buildings in the economy), is another variable that determines production capacity. This variable captures three major components: equipment, software, and structures for both privately and publicly owned goods.

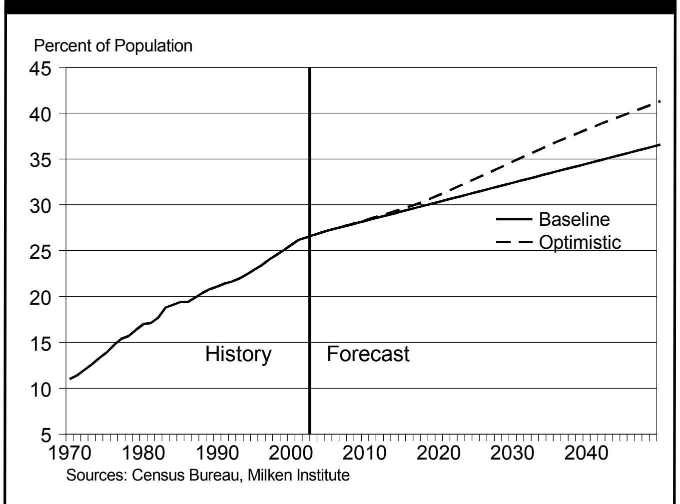
Investments in capital and the accumulation of capital stock determine to some degree how efficiently the labor force is utilized. In turn, capital stock productivity is generally affected by how efficiently the human capital (work force) utilizes it. Remember, higher accumulations of human capital—through education and training—increase the productivity of capital, an endogenous relationship that will affect the optimistic projections of capital stock formation. The baseline historical trends were derived from Census Bureau data on state and local government expenditures, and the private stock (non-governmental) of non-residential goods, as well as projected trends from Global Insight.

(4) Percentage of Population with a Bachelor's Degree

This variable is representative of human capital formation and refers to the level of investment in education and on-the-job training that helps to increase worker productivity or increase a worker's ability to use sophisticated machinery. Recent literature has strongly differentiated between labor force size and human capital formation; this study emphasizes the interplay between the two.

The next figure illustrates the clear trend toward increased education. This is due in large part to the GI Bill, which has helped finance higher education for millions of Americans and created the world's most educated work force. Despite those successes, the U.S. Census Bureau speculates that changes in the population due to race/ethnicity from 2000 to 2020 will bring about substantial and potentially harmful changes to the work force. Substantial declines at every educational level, from high school through graduate study, are forecast. Nearly all states will experience an increase in the workforce share without a high school diploma.

Bachelor's Degree and Above
U.S. Baseline and Optimistic Projections



But this pessimistic view does not account for intergenerational savings for, and investments in, education. It does not account for changes to the consumption patterns of education across demographic groups. Nor does it incorporate the effects of better health. At a minimum, as advances occur in health-care prevention, screening, and treatment, employees will retire later, slowing a decline. Stories of retirees forced back into the labor force by dire financial conditions are common—

but so are stories about retirees who rejoin the working world to regain the stimulation and relationships they miss.

Our baseline projection is therefore optimistic, grounded in the contention that increased longevity and improved health will result in greater intergenerational investments in education. In fact, a Census Bureau working paper indicates that concerns about educational stagnation may be due to data limitations and suggests that educational attainment rates will continue to rise.[91] Likewise, previous models have assumed incorrectly that the educational level at age 30 will be the lifetime level. Another source of rising educational rates is in the non-immigrant female population, which is projected to increase between 17 percent and 22 percent from 2003 to 2028.[92]

Parental effects are also compounding. The children of educated parents tend to attain the same levels of education, an intergenerational link that has been well documented. Many studies have recognized that no social or demographic indicator has a stronger impact on predicting poverty, literacy, and education attainment rates for children than parental education.[93]

91. Cheeseman Day, Jennifer, and Kurt J. Bauman. "Have We Reached the Top? Educational Attainment Projections of the U.S. Population." U.S. Census Bureau Population Division Working Papers, 2000; 43

92. Ibid.

93. Murray, John E. "Generation(s) of Human Capital: Literacy in American Families, 1830-1875." *Journal of Interdisciplinary History*, Winter 1997; 27(3): 413–435. See also: Petronelli, Montez L. "The Significance of Parent Post-Secondary Educational Attainment to Families." The Student Parenting Project.

The top five and bottom five state rankings are shown in the following tables. The top five states— Maryland, Colorado, Massachusetts, Virginia, and Connecticut—are home to a number of research universities and rank high in per capita income.

Historical Bachelor's Degree and Above, 1970

Top 5 States	Percent of Population	Bottom 5 States	Percent of Population
Maryland	13.90	Mississippi	8.10
Colorado	14.90	Kentucky	7.20
Massachusetts	12.60	Wyoming	11.80
Virginia	12.30	Arkansas	6.70
Connecticut	13.70	West Virginia	6.80

Sources: Census Bureau, Milken Institute

Historical Bachelor's Degree and Above, 2003

Top 5 States	Percent of Population	Bottom 5 States	Percent of Population
Maryland	36.83	Mississippi	21.17
Colorado	35.63	Kentucky	21.10
Massachusetts	34.80	Wyoming	19.83
Virginia	33.13	Arkansas	18.10
Connecticut	32.83	West Virginia	15.67

Sources: Census Bureau, Milken Institute

Projected Bachelor's Degree and Above, 2023 -Percent of Population

Top 5 States	Baseline	Optimistic	Bottom 5 States	Baseline	Optimistic
Maryland	41.91	44.64	Mississippi	22.18	23.63
Colorado	41.03	43.71	Kentucky	24.05	25.62
Massachusetts	42.24	44.99	Wyoming	24.34	25.93
Virginia	38.54	41.05	Arkansas	19.93	21.23
Connecticut	38.19	40.67	West Virginia	17.66	18.81

Sources: Census Bureau, Milken Institute

Projected Bachelor's Degree and Above, 2050 - Percent of Population

Top 5 States	Baseline	Optimistic	Bottom 5 States	Baseline	Optimistic
Maryland	50.79	59.60	Mississippi	28.13	33.01
Colorado	50.41	59.18	Kentucky	29.80	34.96
Massachusetts	51.01	59.88	Wyoming	31.50	36.96
Virginia	46.82	54.95	Arkansas	25.33	29.74
Connecticut	47.02	55.20	West Virginia	22.79	26.75

Sources: Census Bureau, Milken Institute

(5) Young Dependents per Capita

The number of dependents per capita represents the population 0–16 years old that is not a part of the labor force and that should therefore have a negative effect on state productivity. Using historical data from Economy.com, we analyze the trend through 2030 and adopt a conservative approach by keeping the same growth rate from 2030 to 2050. Since baseline and optimistic scenarios are the same, the difference between GDP by state will not be affected by a declining population of young dependents.

C. Discussion

The purpose of these projections is to establish the endogenous intergenerational relationships between certain variable inputs (life expectancy, labor force size, human capital formation, etc.) and output levels (state GDP). The purpose of the production function is to describe the relationships between output and input factors. Ours accounts for state differences. However, it alone cannot fully capture the impacts over time. The leads and lags between improved health, and human and physical capital, require cross-sectional "reaction functions." Here, the optimistic variable inputs react with each other and with the production function. For example, the optimistic variable that proxies health (life expectancy at 65) interacts with the education variable (population holding a bachelor's degree).

The coefficients of the regressions, which explain the strength of the relationship of each input variable to the output variable (GDP), are discussed in the following paragraphs.

- The variable life expectancy at age 65 is a significant and positive factor in state output. The coefficient shows a contemporaneous elasticity of GDP at 0.258. This means that a 1.0 percent increase in life expectancy at 65 will translate into a near-term 0.26 percent increase in real GDP, not accounting for full intergenerational effects.

- Improved health increases contributions to a state's productivity level by means of increasing career spans and labor force numbers, improving the quality of the work force, reducing absenteeism and presenteeism, and improving the quality of the work performed.

- This impact is further magnified in workers' decisions to invest in their own education, as well as that of their children. It also may influence their decision to invest in financial and physical assets, in turn generating more state output and increasing current labor and capital stock efficiency as both are influenced by the accumulation of capital stock.

- The coefficient on the labor force size variable is significance and positive. A 1.0 percent increase in the labor force is consistent with a 0.75 percent increase in real GDP. The combined labor force and bachelor's degree coefficients help explain how important human capital is to U.S. economic growth.

- The variable capital stock likewise is another important and common independent variable. We find that a 1.0 percent increase in the capital stock translates to a 0.196 percent increase in real GDP.

- The variable percentage of population with a bachelor's degree, representative of human capital formation, is also positive and significant. This relationship shows that a 1.0 percent increase in the percent of the population with a bachelor's degree or greater results in a 0.506 percent increase in real GDP. Investments in higher education influence many other variables. They affect how well capital and labor inputs are fully utilized. A smarter labor force is generally thought to produce output more efficiently. Education is also associated with higher earnings and greater disposable income—for investing in additional education.

We are able to capture the full effects of health and human capital reinvestments by devising reaction functions that magnify the effect and work as instrumental variable functions that give us the true value of labor, capital, and education. For example, a 1.0 percent increase in life expectancy at age 65 is associated with a 1.8 percent increase in the percent of the adult population with a bachelor's degree or above.

We also included the ratio of young dependents per capita to see how dependent populations, like those under age 16, affect a state's productivity. By looking at both young dependents and life expectancy at 65, we can capture the effects to two sides of a spectrum and derive their individual impacts on productivity. The negative and significant regression coefficient on young dependents indicates that states with high fertility rates will experience decreased growth in the future due to the large number of dependents per capita—until those dependents enter the labor force.

Production Function Results - Dependent Variable: Log (Real GDP by State)

Variables	Coefficient
Log(Life Expectancy at 65)	0.258* (2.05)
Log(Percentage of Population With a Bachelor's Degree)	0.506** (19.31)
Log(Unadjusted Labor Force)	0.750** (26.17)
Log(Capital Stock)	0.196** (14.84)
Log (Young Dependent per Capita)	-0.311** (-7.09)

*Significant at the 5% Level
**Significant at the 1% Level
Source: Milken Institute

Reaction Functions[1]

Variables		
Dependent	Explanatory	Coefficient
Log(Percentage of Population With a Bachelor's Degree)	Log(Life Expectancy at 65)	1.80** (3.95)
Log(Labor Force Participation Rate	Log(Life Expectancy at 65)	0.55** (2.87)
Log(Capital Stock per Employee)	Log(Percentage of Population With a Bachelor's Degree)	0.56** (4.76)

**Significant at the 1% Level
1.Controlling for Other Effects
Source: Milken Institute

Comparison Tables

The baseline intergenerational model is built on the projection of independent variables, given the same growth trend (1970–2003) and baseline PRC projections. The projections themselves represent the embedded investment from future improvements in health.

Inserting the variable **life expectancy at 65** into the optimistic projections, we use the most recently available six years (1997–2003) of NCHS life table data. We insert the optimistic projections for the two leading causes of chronic disease death—cancer and heart disease—to obtain expected mortality rates for the over-65 population. By computing the coefficients between life expectancy and mortality rates, along with forty-year historical trends, we find that in 2023, the optimistic life expectancy will be roughly 0.7 year longer than that of the baseline projection. By 2050, optimistic life expectancy at 65 will increase 1.7 years over the 2050 baseline.

The impact of life expectancy on the **percentage of population with a bachelor's degree** varies over time. Generally, the greater impact should occur within the first twenty years, from 2003 to 2023, and increase at a slower rate until 2050. We control for median earnings by educational attainment, since higher relative incomes will make the acquisition of higher degrees more appealing. We plug this newly created optimistic projection of the **percentage of population with a bachelor's degree** variable into a reaction function to calculate the optimistic capital stock output. Decisions to invest in capital stock (software, equipment, and structures) are determined by the percentage of the population with higher education degrees.

The percentage of population with a bachelor's degree and **life expectancy at 65** both have impacts on the **labor force size**, whose magnitude for each will vary according to an "S" curve. This reaction function shows that decisions to invest in better health will have a positive and significant impact on a person's life, as well as work force longevity.

This model design departs from existing literature by not just projecting domestic regional markets. It also relays the spillover effects of health that have not been captured in any previous models. Better health enables a worker to remain in the labor pool longer. Feedback into the production function will demonstrate by how much this will increase each state's productivity.

Now that we have optimistic data from 2004 through 2050 for each variable, we can use the coefficients from the production function to generate optimistic output (state GDP) from 2004 to 2050. The gap between optimistic and baseline presents a difference of 17.59 percent by 2050. This gap totals $1.201 trillion by 2023 and widens to $5.668 trillion by 2050. We can also compare this gap with that in the baseline/optimistic scenarios for indirect impacts and direct costs from previous chapters.

When other models fail to account for the interaction of health with other variables, they risk a pervasive understating of GDP—by double-digit percentages. Such errors underscore the importance and potential contribution of this research in the field of health economics.

Comparison of U.S. Baseline and Optimistic GDP - US$ Billions

	Real GDP				Nominal GDP			
			Difference				Difference	
Year	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
2004	10764	10788	24	0.22	11070	11094	24	0.22
2005	11063	11114	51	0.46	11721	11775	54	0.46
2006	11428	11494	65	0.57	12464	12535	71	0.57
2007	11797	11887	90	0.76	13139	13239	100	0.76
2008	12148	12257	109	0.90	13794	13918	124	0.90
2009	12494	12635	142	1.13	14467	14631	164	1.13
2010	12825	12994	169	1.32	15152	15351	200	1.32
2011	13147	13353	206	1.57	15860	16109	249	1.57
2012	13451	13691	240	1.79	16564	16860	296	1.79
2013	13737	14011	274	1.99	17250	17594	344	1.99
2014	14021	14342	321	2.29	17941	18352	411	2.29
2015	14305	14672	367	2.56	18648	19126	478	2.56
2016	14600	15019	418	2.87	19382	19937	555	2.87
2017	14928	15418	490	3.28	20182	20844	663	3.28
2018	15256	15834	577	3.78	21005	21800	795	3.78
2019	15591	16269	678	4.35	21861	22812	951	4.35
2020	15938	16741	803	5.04	22759	23905	1147	5.04
2021	16289	17203	914	5.61	23689	25018	1329	5.61
2022	16653	17709	1056	6.34	24664	26228	1564	6.34
2023	17028	18230	1201	7.06	25684	27496	1812	7.06
2024	17416	18761	1346	7.73	26751	28818	2067	7.73
2025	17810	19295	1484	8.33	27861	30183	2322	8.33
2026	18225	19867	1642	9.01	29035	31650	2615	9.01
2027	18648	20440	1792	9.61	30255	33163	2908	9.61
2028	19080	21015	1936	10.15	31525	34723	3198	10.15
2029	19525	21620	2096	10.73	32854	36381	3526	10.73
2030	19977	22232	2254	11.28	34235	38098	3863	11.28
2031	20443	22869	2426	11.87	35677	39912	4234	11.87
2032	20923	23532	2608	12.47	37188	41824	4636	12.47
2033	21416	24190	2775	12.96	38764	43786	5022	12.96
2034	21924	24885	2961	13.51	40413	45872	5459	13.51
2035	22441	25572	3131	13.95	42129	48006	5878	13.95
2036	22975	26281	3306	14.39	43924	50245	6321	14.39
2037	23522	26980	3458	14.70	45798	52532	6734	14.70
2038	24086	27710	3624	15.05	47760	54946	7186	15.05
2039	24666	28443	3777	15.31	49809	57437	7628	15.31
2040	25262	29211	3948	15.63	51953	60073	8120	15.63
2041	25877	29993	4116	15.91	54196	62817	8621	15.91
2042	26505	30786	4282	16.15	56533	65665	9132	16.15
2043	27154	31606	4452	16.39	58985	68654	9670	16.39
2044	27817	32430	4612	16.58	61537	71740	10203	16.58
2045	28505	33292	4787	16.79	64220	75004	10784	16.79
2046	29207	34153	4946	16.93	67011	78359	11347	16.93
2047	29930	35043	5113	17.08	69935	81881	11946	17.08
2048	30676	35969	5293	17.26	72996	85592	12596	17.26
2049	31443	36928	5485	17.44	76198	89490	13292	17.44
2050	32229	37898	5668	17.59	79542	93531	13990	17.59

Sources: Census Bureau, Economy.com, NCHS, Milken Institute

The cumulative differences between baseline and optimistic scenarios for both real and nominal levels of GDP are represented in the following table. Accounting for intergenerational impacts, the difference could be a staggering $1.02 trillion of GDP.

A side-by-side comparison of growth rates shows how GDP is weighted in this projection. From 2004 to 2023, the economy experiences significant growth for both the baseline and optimistic intergenerational scenarios. For the optimistic scenario, our variables are purposely designed to give roughly 60 percent of the impact within the first twenty years due to the shape and slopes of the S-curve technique used in our reaction functions.

U.S. Cumulative Difference in GDP - US$ Billions

	Real GDP	Nominal GDP
Year	Cumulative Difference	Cumulative Difference
2004	24	24
2005	74	78
2006	140	149
2007	230	249
2008	339	373
2009	480	537
2010	649	737
2011	856	986
2012	1,096	1,282
2013	1,370	1,625
2014	1,691	2,037
2015	2,058	2,515
2016	2,476	3,070
2017	2,966	3,733
2018	3,544	4,528
2019	4,222	5,479
2020	5,025	6,625
2021	5,939	7,955
2022	6,995	9,519
2023	8,196	11,331
2024	9,542	13,398
2025	11,026	15,719
2026	12,668	18,334
2027	14,460	21,242
2028	16,396	24,441
2029	18,491	27,967
2030	20,746	31,830
2031	23,172	36,065
2032	25,780	40,701
2033	28,555	45,723
2034	31,516	51,182
2035	34,647	57,060
2036	37,953	63,380
2037	41,412	70,114
2038	45,036	77,300
2039	48,813	84,928
2040	52,762	93,048
2041	56,878	101,669
2042	61,159	110,801
2043	65,611	120,471
2044	70,223	130,674
2045	75,010	141,458
2046	79,956	152,805
2047	85,068	164,752
2048	90,362	177,348
2049	95,847	190,640
2050	101,515	204,629

Sources: Census Bureau, Economy.com, NCHS, Milken Institute

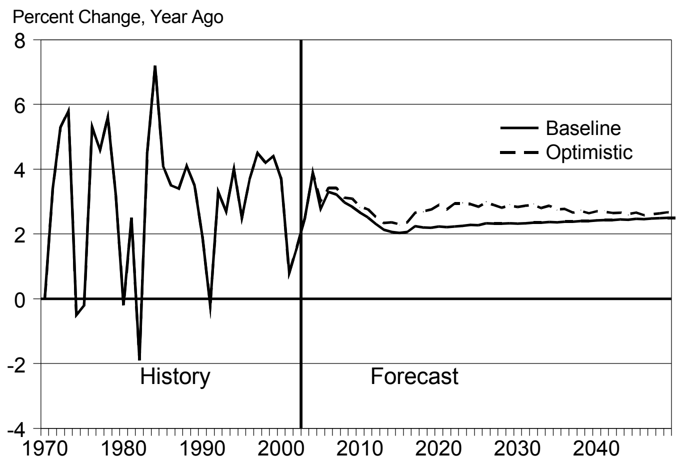
Comparison of U.S. Baseline and Optimistic GDP - US$ Billions

Year	Real Growth Rate of GDP			Nominal Growth Rate of GDP		
	Baseline	Optimistic	Difference	Baseline	Optimistic	Difference
2004	–	–	–	–	–	–
2005	2.78	3.02	0.24	5.89	6.14	0.25
2006	3.30	3.42	0.12	6.33	6.45	0.12
2007	3.22	3.42	0.20	5.42	5.62	0.20
2008	2.98	3.12	0.14	4.99	5.13	0.14
2009	2.84	3.09	0.24	4.88	5.13	0.25
2010	2.66	2.84	0.19	4.73	4.92	0.19
2011	2.51	2.76	0.26	4.67	4.94	0.26
2012	2.31	2.53	0.22	4.44	4.66	0.22
2013	2.13	2.34	0.21	4.14	4.35	0.21
2014	2.06	2.36	0.30	4.00	4.31	0.31
2015	2.03	2.30	0.27	3.94	4.22	0.28
2016	2.06	2.36	0.30	3.94	4.24	0.31
2017	2.24	2.66	0.41	4.13	4.55	0.42
2018	2.20	2.70	0.50	4.08	4.59	0.50
2019	2.19	2.75	0.56	4.07	4.64	0.57
2020	2.23	2.90	0.67	4.11	4.79	0.69
2021	2.21	2.76	0.56	4.09	4.66	0.57
2022	2.23	2.94	0.71	4.12	4.83	0.72
2023	2.25	2.94	0.69	4.13	4.83	0.70
2024	2.28	2.92	0.64	4.16	4.81	0.65
2025	2.27	2.84	0.58	4.15	4.73	0.59
2026	2.33	2.97	0.64	4.21	4.86	0.65
2027	2.32	2.89	0.57	4.20	4.78	0.58
2028	2.32	2.81	0.50	4.20	4.71	0.51
2029	2.33	2.88	0.55	4.22	4.77	0.56
2030	2.32	2.83	0.51	4.20	4.72	0.52
2031	2.33	2.87	0.54	4.21	4.76	0.55
2032	2.35	2.90	0.55	4.23	4.79	0.56
2033	2.35	2.80	0.45	4.24	4.69	0.45
2034	2.37	2.87	0.50	4.26	4.76	0.51
2035	2.36	2.76	0.40	4.25	4.65	0.41
2036	2.38	2.77	0.39	4.26	4.66	0.40
2037	2.38	2.66	0.28	4.27	4.55	0.28
2038	2.40	2.71	0.31	4.28	4.60	0.31
2039	2.40	2.64	0.24	4.29	4.53	0.24
2040	2.42	2.70	0.28	4.31	4.59	0.28
2041	2.43	2.68	0.25	4.32	4.57	0.25
2042	2.43	2.65	0.22	4.31	4.53	0.22
2043	2.45	2.66	0.21	4.34	4.55	0.22
2044	2.44	2.61	0.16	4.33	4.50	0.17
2045	2.47	2.66	0.19	4.36	4.55	0.19
2046	2.46	2.58	0.12	4.35	4.47	0.13
2047	2.48	2.61	0.13	4.36	4.50	0.13
2048	2.49	2.64	0.15	4.38	4.53	0.15
2049	2.50	2.67	0.16	4.39	4.55	0.17
2050	2.50	2.63	0.13	4.39	4.52	0.13

Sources: Census Bureau, Economy.com, NCHS, Milken Institute

For graphical reference, the U.S. historical, baseline, and optimistic forecasts of real GDP are shown in the next graph.

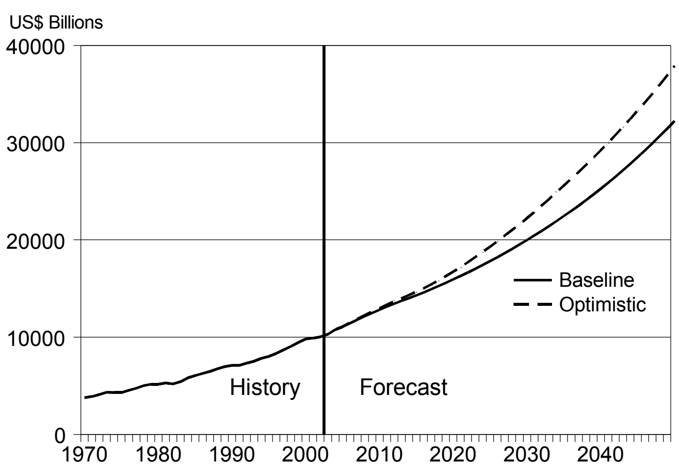
Real GDP Growth - U.S. Baseline and Optimistic Projections



Sources: BEA, Economy.com, Global Insight, Milken Institute

The graph below illustrates the historical trend in real GDP levels.

Real GDP - U.S. Baseline and Optimistic Projections



Sources: BEA, Economy.com, Global Insight, Milken Institute

The preceding tables have highlighted national numbers for GDP levels and growth rates. However, our fixed-effects model allows us to differentiate between states. The following table shows the baseline and optimistic average annual growth rates for all states for both nominal and real GDP comparisons. The top five states, in terms of real optimistic average annual GDP growth rates are Nevada, Arizona, Florida, Texas, and Washington. These states are generally characterized by overall higher growth of labor and capital, and longer life expectancies.

Average Annual Growth in GDP, 2004-2050 by State - Percent Change, Year Ago

	Real Growth Rate of GDP			Nominal Growth Rate of GDP		
State	Baseline	Optimistic	Difference	Baseline	Optimistic	Difference
Alabama	1.78	2.13	0.35	3.73	4.09	0.36
Alaska	2.51	2.87	0.36	4.48	4.85	0.36
Arizona	4.00	4.35	0.36	6.00	6.36	0.36
Arkansas	1.99	2.35	0.36	3.96	4.32	0.36
California	2.82	3.17	0.36	4.79	5.16	0.36
Colorado	2.36	2.72	0.36	4.33	4.69	0.36
Connecticut	1.75	2.11	0.35	3.71	4.07	0.36
Delaware	2.25	2.61	0.36	4.22	4.58	0.36
Florida	3.61	3.97	0.36	5.60	5.97	0.37
Georgia	2.50	2.85	0.36	4.47	4.83	0.36
Hawaii	2.31	2.66	0.36	4.27	4.64	0.36
Idaho	2.99	3.35	0.36	4.97	5.33	0.36
Illinois	1.77	2.13	0.35	3.73	4.09	0.36
Indiana	1.70	2.05	0.35	3.65	4.01	0.36
Iowa	1.50	1.86	0.35	3.46	3.81	0.36
Kansas	1.81	2.17	0.35	3.77	4.13	0.36
Kentucky	1.78	2.13	0.35	3.74	4.10	0.36
Louisiana	1.78	2.13	0.35	3.74	4.10	0.36
Maine	1.96	2.32	0.35	3.93	4.28	0.36
Maryland	2.33	2.68	0.36	4.29	4.66	0.36
Massachusetts	1.76	2.11	0.35	3.72	4.08	0.36
Michigan	1.79	2.14	0.36	3.75	4.11	0.36
Minnesota	2.27	2.63	0.36	4.24	4.60	0.36
Mississippi	1.85	2.20	0.35	3.81	4.17	0.36
Missouri	1.89	2.25	0.35	3.85	4.21	0.36
Montana	2.11	2.47	0.36	4.08	4.44	0.36
Nebraska	1.59	1.95	0.35	3.55	3.91	0.36
Nevada	3.71	4.07	0.36	5.71	6.07	0.36
New Hampshire	2.45	2.81	0.36	4.43	4.79	0.36
New Jersey	2.05	2.41	0.36	4.02	4.37	0.36
New Mexico	2.09	2.45	0.36	4.06	4.42	0.36
New York	1.64	2.00	0.36	3.59	3.96	0.37
North Carolina	2.68	3.04	0.36	4.66	5.02	0.36
North Dakota	1.32	1.68	0.35	3.28	3.63	0.35
Ohio	1.55	1.91	0.35	3.51	3.87	0.36
Oklahoma	1.93	2.29	0.35	3.89	4.25	0.36
Oregon	2.71	3.06	0.36	4.68	5.04	0.37
Pennsylvania	1.60	1.95	0.35	3.55	3.91	0.36
Rhode Island	1.70	2.05	0.35	3.66	4.01	0.36
South Carolina	2.25	2.60	0.36	4.22	4.57	0.36
South Dakota	1.51	1.86	0.35	3.47	3.82	0.36
Tennessee	2.18	2.54	0.36	4.15	4.51	0.36
Texas	3.06	3.42	0.35	5.04	5.40	0.36
Utah	2.97	3.33	0.36	4.95	5.31	0.36
Vermont	2.10	2.46	0.36	4.07	4.43	0.36
Virginia	2.44	2.79	0.36	4.41	4.77	0.36
Washington	2.99	3.35	0.36	4.97	5.34	0.37
West Virginia	1.29	1.64	0.35	3.25	3.60	0.35
Wisconsin	1.97	2.33	0.36	3.93	4.29	0.36
Wyoming	1.98	2.33	0.35	3.94	4.30	0.35

Sources: Census Bureau, Economy.com, NCHS, Milken Institute

The next tables rank the top five and bottom five states in terms of historical real GDP. The top five overall performers in 2003 are not surprising at all. California, New York, Texas, Florida, and Illinois all enjoy large economies, large land mass, and large industries. The economies of the bottom five states are generally based in the service sectors or agriculture. There are a lot of vacant miles in Montana, North and South Dakota, and Wyoming. Vermont has small land mass, relatively remote geographical status, and little industry.

Historical Real GDP by State, 1970

Top 5 States	US$ Billions	Bottom 5 States	US$ Billions
California	243.85	South Dakota	4.20
New York	203.35	Montana	4.43
Texas	96.82	North Dakota	3.65
Florida	70.46	Vermont	3.86
Illinois	105.60	Wyoming	2.84

Source: Milken Institute

Historical Real GDP by State, 2003

Top 5 States	US$ Billions	Bottom 5 States	US$ Billions
California	1468.90	South Dakota	27.18
New York	833.52	Montana	24.91
Texas	815.68	North Dakota	21.01
Florida	553.94	Vermont	20.87
Illinois	499.50	Wyoming	20.11

Source: Milken Institute

Projected Real GDP by State, 2023 - US$ Billions

Top 5 States	Baseline	Optimistic	Bottom 5 States	Baseline	Optimistic
California	2450.61	2621.31	South Dakota	39.26	42.05
New York	1093.76	1173.00	Montana	46.05	49.31
Texas	1273.57	1364.75	North Dakota	29.64	31.74
Florida	1159.87	1239.00	Vermont	33.14	35.49
Illinois	678.06	726.16	Wyoming	32.56	34.86

Source: Milken Institute

Projected Real GDP by State, 2050 - US$ Billions

Top 5 States	Baseline	Optimistic	Bottom 5 States	Baseline	Optimistic
California	5188.22	6096.22	South Dakota	56.30	66.20
New York	1650.46	1945.55	Montana	77.44	91.09
Texas	2946.70	3466.98	North Dakota	40.59	47.72
Florida	3009.00	3540.33	Vermont	56.26	66.15
Illinois	1072.18	1260.62	Wyoming	52.23	61.40

Source: Milken Institute

VI: CONCLUSION

This report quantifies the staggering cost for the national economy, and to employers, of failing to address the rising costs of chronic disease. It differs from the majority of research, which generally addresses the costs of specific diseases for individuals, government programs, or society as a whole.

While our focus on aggregate economic impact dictates a different methodological approach, our results are generally consistent with other published estimates for treatment expenditures and productivity losses. Our findings on the long-term impacts of improvements in health are also consistent with the few published studies of this kind. A study by Murphy and Topel, for example,[94] found even more dramatic savings, concluding in 2003 that a 10 percent reduction in mortality from heart disease would have a value of $5.5 trillion to current and future generations, while a 10 percent reduction in mortality from cancer would be worth $4.4 trillion.

The clear implication of our findings is that good health is an investment in economic growth. The United States faces an increasingly competitive global economy, and our national economic performance is closely tied to our ability to maintain the best-educated, most highly trained, and healthiest work force. While it is well understood among policy-makers that economic growth is dependent on investments in human capital, the importance of good health in maintaining a competitive work force is frequently ignored. Better health leads to greater investments in education, resulting in higher levels of human capital—which in turn causes wealth to increase in a virtuous cycle of economic growth.

During the past twenty-five years, the United States has made remarkable progress in reducing death and disability attributable to many chronic diseases. Behavioral changes—especially the reduction in smoking—and early screening and innovations in medical technology and interventions are responsible for the improvement. Yet much remains to be accomplished to diminish the deleterious impacts on the quality and length of life.

Our findings lead to the following observations:

- **Without action soon, aging of our population will lead to critically high rates of chronic disease.**

  Despite reductions in cancer incidence and heart disease prevalence, the aging population will likely lead to dramatic increases in these disease rates over the next two decades. Prevention and early intervention, however, can reduce disability and premature death rates. We project that as many as 40 million cases of chronic disease could potentially be avoided in the next twenty years.

- **The business cost of lost productivity is huge compared to the costs of treatment.**

  In 2003 the United States spent $227.0 billion on the seven chronic diseases studied here. But after accounting for lost workdays and lowered employee productivity, the indirect impacts on employers and the economy ran an additional $1.1 trillion. Behavioral changes, early intervention, and more effective management of existing disease can reduce the human suffering and costs. We could, in fact, reasonably expect within two decades to reduce the economic impact of these diseases by as much as $1.3 trillion annually—of which the lion's share, $905.0 billion, would result from gains in worker productivity.

94. Kevin Murphy and Robert Topel, "Diminishing Returns? The Costs and Benefits of Improving Health," Perspectives in Biology and Medicine 46, no. 3 Supplement Summer (2003).

- **Promoting better health is an investment in economic growth.**

  Good health contributes to economic growth: we project that in 2050, with improved prevention and early intervention, real economic output could grow by 17.6 percent over baseline projections, or $5.7 trillion. Better health leads to greater investments in education, resulting in higher levels of human capital—which in turn cause wealth to increase in a virtuous cycle of economic growth. At the macroeconomic level, increased health, lower chronic disease, and improved life expectancy raise the rates of return to a variety of investments. The result is faster human and physical capital accumulation that ignites an explosion in knowledge and technology.

With these observations in mind, we offer the following recommendations for change:

- **National health care expenditures should be reported for key chronic diseases.**

  Significant gap exist in the country's system of reporting health-care expenditures. While we have very good information on spending by type of purchaser and by site of service, we do not track national spending by condition. Sources like the MEPS survey go a long distance in filling this gap, but there is a critical need for a new system of national health accounts that would help policy-makers assess the value we are receiving in return for our spending. We must develop a way to measure growth in treatment costs that simultaneously allows us to evaluate progress in improving treatment outcomes. Today such analysis requires a team of computer programmers to assemble; it should be available in simple tables for the general public.

- **The incentives in the health-care system should promote prevention and early intervention.**

  The health-care system, both public and private, must introduce incentives that encourage and reward prevention and early intervention. Most chronic diseases are highly preventable. Their shared risk factors suggest that coordinated prevention programs could have a major impact. Today our health-care system is a leader in providing world-class care for people with acute illnesses. We need to focus our efforts on creating the same level of excellence in preventing and managing chronic disease.

- **As a nation, we need to renew our commitment to achieving a "healthy body weight."**
  Increasing obesity rates threaten to send treatment costs for diabetes and related conditions, such as heart disease and stroke, soaring over the next twenty years. We need a strong, long-term national commitment to promote health, wellness, and healthy body weight. Employers, insurers, governments, and communities all need to work together to achieve this. Much of the effort could be directed at educating consumers to change behaviors. If we could reduce the rate of obesity over the next twenty years, we could likely lower annual health-care expenditures by $59.7 billion.

There are important impacts on government and businesses. Medicare, the fastest-growing component of the federal budget, threatens to widen the budget deficit to unacceptable levels unless changes are made. The impact on state budgets is equally onerous: Medicaid falls behind prison expenditures for fastest-growing state spending category.

Escalating health-care costs are eroding the ability of U.S. companies to compete against foreign firms. In many cases, foreign governments cover health costs, or U.S. competitors don't bear the full costs of providing health-care coverage. Additionally, many U.S. firms provide health-insurance coverage to their retirees, which increases costs dramatically. Holding other factors constant, lower costs of health care permit foreign firms to offer lower prices for goods and services.

The rise in chronic disease is costing us lives, quality of life, and prosperity. Our current health-care debates focus primarily on the extension of coverage and the design of efficient financing mechanisms. Equal attention should be paid to addressing the rising rates of chronic illness that will sap our productivity and drive our health-care costs needlessly higher. Our results show that even modest reductions in the burden of disease would yield dividends not just in lower health-care costs, but in higher productivity and economic output.

Our analysis should be seen as a contribution toward a sorely needed national discussion on health-care spending and chronic disease. Further research will add additional precision and knowledge on the multiple personal, societal, and economic costs of chronic disease, as well as opportunities to reduce or avoid these costs.

Appendix I

Risk Factors Associated with Chronic Disease - Based on Comprehensive Literature Review

	Breast Cancer	Colon Cancer	Lung Cancer	Prostate Cancer	Asthma	Diabetes	Mental Disorders	Heart Disease	Hypertension	Stroke
Behavioral Risk Factors										
Smoking		X	X		X			X		X
Alcohol	X	X					X	X	X	X
Overweight/Obesity	X	X		X		X		X	X	X
Physical inactivity	X	X		X		X		X	X	X
Diets high in fat	X	X							X	X
Diets high in saturated fats								X		
High-fat dairy products				X						
Diets high in red meat		X		X						
Diets low in fruit, vegetables,poultry,fish& fiber		X								
Diets high in cholesterol								X	X	X
Diets high in sodium/salt								X	X	X
Diet high in omega-3 fatty acids							X			
Trans fatty acids				X						
High/abnormal blood cholesterol						X		X		X
Stress							X	X	X	
STDs				X						
Chemical exposure (asbestos, arsenic radon)			X							
Exposure and inhalation of allergens,irritants					X					
Outdoor air quality					X					
Use of illegal drugs							X			
Comorbidities										
Heart disease						X	X			X
Stroke							X			
Cancer							X			
Alzheimer's							X			
Diabetes								X		X
Hypertension						X		X		X
Demographic Risk Factors										
Population under 40					X					
Population over 45			X							
Population over 50		X								
Population over 65			X					X		X
Male population								X		
Female population							X			
Male population over 65				X						
Female population over 50	X									
White population										X
African-American population					X	X		X		X
African-American male population				X						
Hispanic/Latino population						X		X		

Appendix II

Alabama

Direct Costs	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	167	4,353	0.72	254	209	7,998	7,280	2.03	1.52	-45	-17.79	-718	-8.97	-0.51	-25.16
Breast cancer	18	4,577	0.08	25	22	8,416	7,654	0.21	0.17	-3	-12.30	-762	-9.05	-0.04	-20.24
Colon cancer	5	11,277	0.06	7	5	22,552	20,518	0.15	0.11	-1	-17.67	-2,034	-9.02	-0.04	-25.09
Lung cancer	6	17,227	0.11	8	6	31,752	28,877	0.24	0.18	-1	-18.44	-2,874	-9.05	-0.06	-25.83
Prostate cancer	15	3,527	0.05	24	19	6,627	6,027	0.16	0.11	-5	-21.48	-599	-9.04	-0.05	-28.58
Other cancers	122	3,524	0.43	191	157	6,679	6,076	1.28	0.95	-34	-18.00	-604	-9.04	-0.32	-25.42
Diabetes	245	1,931	0.47	337	292	3,635	3,306	1.22	0.97	-45	-13.30	-329	-9.04	-0.26	-21.14
Heart disease	378	3,201	1.20	500	327	6,358	5,784	3.18	1.89	-173	-34.63	-573	-9.02	-1.29	-40.52
Pulmonary conditions	854	866	0.74	1,062	913	1,682	1,531	1.79	1.40	-149	-14.05	-152	-9.03	-0.39	-21.81
Hypertension	737	963	0.71	938	762	1,815	1,651	1.70	1.26	-175	-18.70	-164	-9.04	-0.44	-26.05
Stroke	46	5,588	0.26	54	44	11,290	10,272	0.61	0.45	-10	-18.84	-1,018	-9.01	-0.16	-26.16
Mental disorders	485	1,258	0.61	671	589	2,351	2,138	1.58	1.26	-83	-12.35	-213	-9.05	-0.32	-20.28
Total	2,912	1,619	4.72	3,816	3,136	3,589	3,265	12.11	8.74	-681	-17.84	-324	-9.03	-3.37	-27.83

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	4.27	0.72	0.59	12.24	7.27	0.052	0.043	1.18	0.77	14.20	8.68	-5.52	-38.86
Breast cancer	0.47	0.07	0.06	1.25	0.79	0.005	0.005	0.12	0.08	1.45	0.94	-0.50	-34.84
Colon cancer	0.36	0.05	0.04	0.89	0.53	0.004	0.003	0.09	0.06	1.03	0.63	-0.40	-38.80
Lung cancer	0.63	0.09	0.07	1.45	0.85	0.006	0.005	0.14	0.09	1.68	1.02	-0.66	-39.40
Prostate cancer	0.31	0.06	0.04	0.96	0.55	0.004	0.003	0.09	0.06	1.12	0.65	-0.47	-41.65
Other cancers	2.50	0.45	0.37	7.69	4.56	0.033	0.027	0.74	0.48	8.92	5.43	-3.48	-39.07
Diabetes	1.87	0.55	0.48	4.53	3.55	0.044	0.038	0.48	0.38	5.62	4.45	-1.17	-20.76
Heart disease	2.07	1.16	0.76	4.22	2.31	0.114	0.074	0.41	0.22	5.91	3.37	-2.54	-43.01
Asthma	1.63	0.88	0.75	3.12	2.54	0.064	0.055	0.30	0.25	4.36	3.59	-0.77	-17.74
Hypertension	5.61	2.26	1.84	11.75	9.30	0.222	0.181	1.14	0.90	15.38	12.22	-3.16	-20.55
Stroke	0.42	0.18	0.15	0.79	0.60	0.013	0.010	0.08	0.06	1.06	0.81	-0.25	-23.35
Emotional disturbances	2.73	0.90	0.79	6.58	5.53	0.066	0.057	0.63	0.53	8.18	6.91	-1.27	-15.54
Total	18.59	6.66	5.36	43.23	31.09	0.58	0.46	4.23	3.10	54.70	40.02	-14.67	-26.83

* Based on Nominal GDP

Intergenerational Impacts			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	7.80	21.87	25.53	27.19	1.66	6.50	31.41	36.86	5.45	17.35
Capital stock (US$ Billions)	85.35	249.25	475.41	492.73	17.32	3.64	1304.40	1431.22	126.82	9.72
Life expectancy at 65 (years)	14.75	17.09	18.69	19.77	1.08	5.75	21.37	23.43	2.06	9.64
GDP* by state (US$ Billions)	23.22	129.22	199.11	213.15	14.05	7.06	310.51	365.07	54.56	17.57

*Based on Real GDP

Alaska

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	20	5,860	0.12	40	33	13,498	11,910	0.55	0.40	-7	-17.73	-1,588	-11.76	-0.15	-27.41
Breast cancer	2	6,277	0.01	5	4	14,139	12,465	0.07	0.05	-1	-12.30	-1,673	-11.84	-0.01	-22.68
Colon cancer	1	16,298	0.01	1	1	41,027	36,197	0.06	0.04	0	-17.67	-4,831	-11.77	-0.02	-27.36
Lung cancer	1	22,446	0.02	1	1	50,713	44,711	0.07	0.05	0	-18.44	-6,002	-11.83	-0.02	-28.10
Prostate cancer	2	5,285	0.01	4	3	12,247	10,799	0.05	0.04	-1	-21.48	-1,448	-11.82	-0.02	-30.76
Other cancers	15	4,447	0.07	29	23	10,428	9,196	0.30	0.22	-5	-18.00	-1,232	-11.81	-0.08	-27.69
Diabetes	20	2,560	0.05	33	28	5,950	5,246	0.19	0.15	-4	-13.30	-703	-11.82	-0.05	-23.54
Heart disease	17	4,807	0.08	39	25	11,989	10,577	0.46	0.27	-13	-34.63	-1,412	-11.78	-0.20	-42.33
Pulmonary conditions	105	1,180	0.12	146	126	2,856	2,519	0.42	0.32	-21	-14.05	-337	-11.80	-0.10	-24.19
Hypertension	60	1,128	0.07	86	70	2,627	2,317	0.23	0.16	-16	-18.70	-310	-11.82	-0.06	-28.30
Stroke	3	8,223	0.02	5	4	20,983	18,514	0.10	0.07	-1	-18.84	-2,469	-11.77	-0.03	-28.39
Mental disorders	74	2,273	0.17	133	116	5,229	4,611	0.69	0.54	-16	-12.35	-618	-11.82	-0.16	-22.71
Total	299	2,130	0.64	482	403	5,962	5,258	2.64	1.90	-79	-16.37	-704	-11.80	-0.74	-28.12

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	0.52	0.12	0.09	1.95	1.16	0.008	0.007	0.19	0.12	2.26	1.38	-0.88	-38.82
Breast cancer	0.05	0.01	0.01	0.24	0.15	0.001	0.001	0.02	0.02	0.27	0.18	-0.10	-34.83
Colon cancer	0.06	0.01	0.01	0.21	0.12	0.001	0.001	0.02	0.01	0.24	0.15	-0.09	-38.78
Lung cancer	0.08	0.01	0.01	0.25	0.15	0.001	0.001	0.02	0.02	0.29	0.17	-0.11	-39.40
Prostate cancer	0.05	0.01	0.01	0.19	0.11	0.001	0.001	0.02	0.01	0.22	0.13	-0.09	-41.65
Other cancers	0.28	0.06	0.05	1.06	0.63	0.005	0.004	0.10	0.07	1.23	0.75	-0.48	-39.06
Diabetes	0.15	0.05	0.05	0.44	0.34	0.004	0.004	0.05	0.04	0.54	0.43	-0.11	-20.76
Heart disease	0.09	0.09	0.06	0.33	0.18	0.009	0.006	0.03	0.02	0.46	0.26	-0.20	-43.01
Asthma	0.20	0.12	0.10	0.43	0.35	0.009	0.008	0.04	0.03	0.60	0.49	-0.11	-17.74
Hypertension	0.45	0.21	0.17	1.08	0.85	0.020	0.017	0.10	0.08	1.41	1.12	-0.29	-20.55
Stroke	0.02	0.02	0.01	0.07	0.05	0.001	0.001	0.01	0.01	0.09	0.07	-0.02	-23.35
Emotional disturbances	0.42	0.18	0.16	1.30	1.09	0.013	0.011	0.12	0.10	1.61	1.36	-0.25	-15.54
Total	1.86	0.78	0.64	5.59	4.03	0.06	0.05	0.54	0.40	6.98	5.13	-1.86	-26.59

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	14.10	25.10	28.34	30.18	1.84	6.51	36.61	42.97	6.36	17.38
Capital stock (US$ Billions)	29.44	57.83	117.18	121.45	4.27	3.64	401.53	440.63	39.10	9.72
Life expectancy at 65 (years)	14.70	18.38	20.10	21.26	1.16	5.76	22.98	25.20	2.22	9.65
GDP* by state (US$ Billions)	8.09	30.27	59.60	63.81	4.21	7.06	119.80	140.88	21.08	17.60

*Based on Real GDP

Arizona

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	161	3,716	0.60	355	292	7,786	6,959	2.76	2.03	-63	-17.74	-826	-10.61	-0.73	-26.48
Breast cancer	16	4,141	0.07	34	30	8,568	7,652	0.29	0.23	-4	-12.30	-916	-10.69	-0.06	-21.67
Colon cancer	6	9,849	0.06	11	9	22,519	20,124	0.26	0.19	-2	-17.67	-2,395	-10.64	-0.07	-26.42
Lung cancer	7	14,512	0.10	13	11	30,111	26,893	0.39	0.28	-2	-18.44	-3,217	-10.68	-0.11	-27.16
Prostate cancer	11	3,381	0.04	28	22	7,178	6,411	0.20	0.14	-6	-21.48	-766	-10.67	-0.06	-29.86
Other cancers	121	2,820	0.34	268	220	6,049	5,404	1.62	1.19	-48	-18.00	-645	-10.67	-0.43	-26.75
Diabetes	217	1,752	0.38	508	440	3,729	3,331	1.89	1.47	-68	-13.30	-398	-10.67	-0.43	-22.55
Heart disease	294	2,940	0.87	613	401	6,666	5,957	4.09	2.39	-212	-34.63	-709	-10.64	-1.70	-41.58
Pulmonary conditions	824	761	0.63	1,412	1,214	1,679	1,500	2.37	1.82	-198	-14.05	-179	-10.65	-0.55	-23.21
Hypertension	559	790	0.44	1,120	910	1,685	1,505	1.89	1.37	-209	-18.70	-180	-10.67	-0.52	-27.37
Stroke	33	4,917	0.16	63	51	11,380	10,170	0.72	0.52	-12	-18.84	-1,210	-10.63	-0.20	-27.47
Mental disorders	683	1,559	1.08	1,471	1,290	3,288	2,937	4.84	3.79	-182	-12.35	-351	-10.68	-1.05	-21.71
Total	2,771	1,500	4.15	5,542	4,598	3,706	3,311	18.56	13.39	-944	-17.04	-395	-10.66	-5.17	-27.87

Direct Costs

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	4.14	1.01	0.83	17.07	10.15	0.073	0.060	1.65	1.07	19.80	12.11	-7.69	-38.83
Breast cancer	0.45	0.11	0.09	1.79	1.13	0.008	0.007	0.17	0.12	2.07	1.35	-0.72	-34.83
Colon cancer	0.42	0.09	0.08	1.58	0.94	0.007	0.006	0.15	0.10	1.83	1.12	-0.71	-38.79
Lung cancer	0.68	0.14	0.12	2.41	1.42	0.010	0.008	0.23	0.15	2.80	1.70	-1.10	-39.40
Prostate cancer	0.26	0.07	0.06	1.26	0.71	0.005	0.004	0.12	0.08	1.46	0.85	-0.61	-41.65
Other cancers	2.33	0.59	0.48	10.03	5.95	0.043	0.035	0.97	0.63	11.64	7.09	-4.55	-39.06
Diabetes	1.65	0.84	0.73	6.83	5.36	0.067	0.058	0.73	0.57	8.47	6.71	-1.76	-20.76
Heart disease	1.61	1.42	0.93	5.17	2.83	0.140	0.091	0.50	0.27	7.24	4.12	-3.11	-43.01
Asthma	1.57	1.17	1.00	4.15	3.37	0.085	0.073	0.40	0.33	5.80	4.77	-1.03	-17.74
Hypertension	4.25	2.70	2.20	14.04	11.10	0.265	0.216	1.36	1.08	18.36	14.59	-3.77	-20.55
Stroke	0.30	0.21	0.17	0.93	0.70	0.015	0.012	0.09	0.07	1.24	0.95	-0.29	-23.35
Emotional disturbances	3.85	1.98	1.74	14.41	12.11	0.144	0.126	1.38	1.16	17.92	15.13	-2.78	-15.54
Total	17.36	9.33	7.59	62.60	45.63	0.79	0.64	6.12	4.55	78.84	58.40	-20.44	-25.92

Indirect Impacts* (US$ Billions)

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	12.60	25.57	29.87	31.82	1.95	6.52	37.42	43.91	6.49	17.34
Capital stock (US$ Billions)	64.57	361.30	1057.83	1096.46	38.63	3.64	5171.08	5673.49	502.41	9.72
Life expectancy at 65 (years)	15.50	19.36	21.17	22.39	1.22	5.77	24.21	26.54	2.33	9.63
GDP* by state (US$ Billions)	15.76	183.95	372.28	398.60	26.32	7.07	1063.41	1246.58	183.17	17.22

*Based on Real GDP

Arkansas

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	125	3,947	0.49	197	161	7,504	6,762	1.48	1.09	-35	-17.94	-742	-9.89	-0.38	-26.06
Breast cancer	12	3,921	0.05	16	14	7,701	6,933	0.12	0.10	-2	-12.30	-768	-9.97	-0.03	-21.04
Colon cancer	4	10,935	0.04	5	4	23,566	21,227	0.11	0.08	-1	-17.67	-2,339	-9.93	-0.03	-25.84
Lung cancer	3	15,460	0.05	4	4	30,444	27,409	0.13	0.10	-1	-18.44	-3,035	-9.97	-0.03	-26.58
Prostate cancer	14	3,166	0.04	23	18	6,368	5,734	0.15	0.10	-5	-21.48	-634	-9.96	-0.04	-29.30
Other cancers	93	3,195	0.30	149	122	6,491	5,844	0.97	0.71	-27	-18.00	-646	-9.95	-0.25	-26.17
Diabetes	126	1,695	0.21	180	156	3,418	3,078	0.61	0.48	-24	-13.30	-340	-9.96	-0.13	-21.93
Heart disease	224	3,081	0.68	287	188	6,589	5,935	1.89	1.11	-99	-34.63	-654	-9.93	-0.78	-41.12
Pulmonary conditions	503	796	0.40	655	563	1,660	1,495	1.09	0.84	-92	-14.05	-165	-9.94	-0.25	-22.60
Hypertension	411	829	0.34	548	445	1,674	1,507	0.92	0.67	-102	-18.70	-167	-9.96	-0.25	-26.79
Stroke	32	5,541	0.18	38	31	12,077	10,879	0.45	0.33	-7	-18.84	-1,198	-9.92	-0.12	-26.89
Mental disorders	278	1,096	0.30	406	356	2,191	1,973	0.89	0.70	-50	-12.35	-218	-9.96	-0.19	-21.08
Total	1,701	1,527	2.60	2,311	1,900	3,728	3,358	7.33	5.23	-410	-17.76	-370	-9.94	-2.10	-28.63

Direct Costs

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	3.21	0.56	0.46	9.46	5.62	0.040	0.033	0.92	0.59	10.98	6.70	-4.28	-38.98
Breast cancer	0.31	0.05	0.04	0.80	0.50	0.003	0.003	0.08	0.05	0.92	0.60	-0.32	-34.84
Colon cancer	0.28	0.04	0.03	0.70	0.42	0.003	0.002	0.07	0.04	0.81	0.50	-0.32	-38.80
Lung cancer	0.35	0.05	0.04	0.84	0.50	0.004	0.003	0.08	0.05	0.98	0.59	-0.39	-39.41
Prostate cancer	0.29	0.06	0.04	0.93	0.53	0.004	0.003	0.09	0.06	1.08	0.63	-0.45	-41.65
Other cancers	1.98	0.37	0.30	6.19	3.67	0.026	0.022	0.60	0.39	7.19	4.38	-2.81	-39.07
Diabetes	0.96	0.30	0.26	2.42	1.90	0.024	0.020	0.26	0.20	3.00	2.38	-0.62	-20.76
Heart disease	1.22	0.67	0.44	2.42	1.33	0.066	0.043	0.23	0.13	3.39	1.93	-1.46	-43.01
Asthma	0.96	0.54	0.46	1.93	1.56	0.039	0.034	0.19	0.15	2.69	2.22	-0.48	-17.74
Hypertension	3.13	1.32	1.07	6.87	5.43	0.130	0.106	0.67	0.53	8.98	7.14	-1.85	-20.55
Stroke	0.29	0.13	0.10	0.55	0.42	0.009	0.007	0.05	0.04	0.74	0.57	-0.17	-23.35
Emotional disturbances	1.57	0.55	0.48	3.98	3.34	0.040	0.035	0.38	0.32	4.95	4.18	-0.77	-15.54
Total	11.34	4.06	3.27	27.63	19.59	0.35	0.28	2.70	1.96	34.73	25.11	-9.63	-27.71

Indirect Impacts* (US$ Billions)

* Based on Nominal GDP

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	6.70	18.10	19.93	21.23	1.30	6.51	25.33	29.74	4.41	17.40
Capital stock (US$ Billions)	40.29	139.47	278.90	289.08	10.18	3.64	810.72	889.75	79.04	9.72
Life expectancy at 65 (years)	15.37	17.75	19.41	20.53	1.12	5.76	22.19	24.33	2.14	9.66
GDP* by state (US$ Billions)	11.96	75.16	112.17	120.10	7.93	7.07	186.30	219.12	32.82	17.62

Intergenerational Impacts

*Based on Real GDP

California

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	1,155	4,121	4.76	1,927	1,584	6,902	6,366	13.30	10.08	-343	-17.80	-536	-7.76	-3.22	-24.18
Breast cancer	116	4,609	0.53	191	168	7,783	7,172	1.49	1.20	-24	-12.30	-611	-7.85	-0.29	-19.18
Colon cancer	43	10,815	0.46	60	49	19,631	18,095	1.17	0.89	-11	-17.67	-1,536	-7.82	-0.28	-24.11
Lung cancer	44	16,217	0.70	61	50	27,439	25,285	1.68	1.26	-11	-18.44	-2,154	-7.85	-0.42	-24.85
Prostate cancer	108	3,755	0.40	199	156	6,459	5,952	1.28	0.93	-43	-21.48	-507	-7.84	-0.35	-27.64
Other cancers	845	3,127	2.64	1,416	1,161	5,420	4,995	7.67	5.80	-255	-18.00	-425	-7.84	-1.87	-24.43
Diabetes	1,573	1,904	2.99	2,586	2,242	3,281	3,023	8.48	6.78	-344	-13.30	-257	-7.84	-1.71	-20.10
Heart disease	1,860	3,218	6.00	2,920	1,909	5,807	5,353	16.96	10.22	-1,011	-34.63	-454	-7.83	-6.74	-39.74
Pulmonary conditions	5,301	826	4.37	6,982	6,001	1,462	1,348	10.21	8.09	-981	-14.05	-115	-7.83	-2.12	-20.79
Hypertension	3,660	853	3.12	5,408	4,397	1,472	1,356	7.96	5.96	-1,011	-18.70	-115	-7.84	-2.00	-25.07
Stroke	241	5,374	1.29	339	275	9,842	9,072	3.33	2.49	-64	-18.84	-770	-7.82	-0.84	-25.19
Mental disorders	2,534	1,703	4.36	4,084	3,579	2,915	2,686	11.90	9.61	-504	-12.35	-229	-7.85	-2.29	-19.23
Total	16,324	1,646	26.87	24,245	19,987	3,373	3,109	72.15	53.24	-4,258	-17.56	-264	-7.83	-18.91	-26.20

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	29.60	5.49	4.48	92.75	55.14	0.40	0.32	8.97	5.83	107.60	65.78	-41.83	-38.87
Breast cancer	3.31	0.61	0.54	10.39	6.59	0.04	0.04	1.01	0.70	12.06	7.86	-4.20	-34.84
Colon cancer	2.90	0.48	0.40	8.17	4.86	0.03	0.03	0.79	0.51	9.48	5.80	-3.68	-38.82
Lung cancer	4.40	0.69	0.56	11.72	6.90	0.05	0.04	1.13	0.73	13.59	8.24	-5.36	-39.41
Prostate cancer	2.52	0.53	0.41	8.95	5.08	0.04	0.03	0.87	0.54	10.38	6.06	-4.33	-41.66
Other cancers	16.47	3.17	2.58	53.52	31.71	0.23	0.19	5.18	3.36	62.09	37.83	-24.26	-39.08
Diabetes	12.00	4.26	3.70	34.82	27.30	0.34	0.29	3.71	2.89	43.13	34.18	-8.95	-20.76
Heart disease	10.17	6.78	4.43	24.64	13.47	0.67	0.43	2.38	1.30	34.47	19.64	-14.82	-43.01
Asthma	10.09	5.76	4.95	20.51	16.67	0.42	0.36	1.99	1.62	28.69	23.60	-5.09	-17.74
Hypertension	27.83	13.05	10.61	67.78	53.61	1.28	1.04	6.57	5.20	88.69	70.46	-18.23	-20.55
Stroke	2.20	1.14	0.92	4.95	3.74	0.08	0.07	0.48	0.37	6.65	5.10	-1.55	-23.35
Emotional disturbances	14.27	5.50	4.82	40.00	33.62	0.40	0.35	3.84	3.23	49.74	42.01	-7.73	-15.54
Total	106.16	41.97	33.92	285.46	203.55	3.58	2.87	27.95	20.43	358.97	260.77	-98.20	-27.36

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	13.40	28.93	34.12	36.35	2.23	6.54	42.38	49.74	7.36	17.36
Capital stock (US$ Billions)	822.81	2564.25	5803.59	6016.15	212.56	3.64	20134.27	22092.73	1958.46	9.72
Life expectancy at 65 (years)	15.52	19.29	21.09	22.31	1.22	5.78	24.12	26.45	2.33	9.64
GDP* by state (US$ Billions)	243.85	1468.90	2450.61	2621.31	170.70	6.97	5188.22	6096.22	908.00	17.50

*Based on Real GDP

Colorado

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	148	4,319	0.64	246	202	9,096	8,106	2.24	1.64	-44	-17.80	-990	-10.89	-0.60	-26.75
Breast cancer	15	4,853	0.07	25	22	10,264	9,137	0.25	0.20	-3	-12.30	-1,128	-10.99	-0.06	-21.93
Colon cancer	5	11,266	0.06	7	6	26,407	23,520	0.19	0.14	-1	-17.67	-2,887	-10.93	-0.05	-26.67
Lung cancer	5	16,837	0.09	8	6	35,713	31,790	0.27	0.20	-1	-18.44	-3,923	-10.98	-0.07	-27.40
Prostate cancer	14	3,932	0.05	26	20	8,539	7,602	0.22	0.16	-6	-21.48	-937	-10.97	-0.07	-30.09
Other cancers	109	3,277	0.36	181	148	7,195	6,406	1.30	0.95	-33	-18.00	-789	-10.97	-0.35	-27.00
Diabetes	132	1,904	0.25	205	178	4,146	3,691	0.85	0.66	-27	-13.30	-455	-10.97	-0.19	-22.81
Heart disease	176	3,330	0.59	271	177	7,739	6,893	2.10	1.22	-94	-34.63	-846	-10.94	-0.88	-41.77
Pulmonary conditions	672	842	0.56	873	750	1,904	1,696	1.66	1.27	-123	-14.05	-209	-10.95	-0.39	-23.47
Hypertension	397	848	0.34	547	445	1,851	1,648	1.01	0.73	-102	-18.70	-203	-10.97	-0.28	-27.61
Stroke	25	5,549	0.14	35	29	13,171	11,732	0.46	0.34	-7	-18.84	-1,439	-10.93	-0.13	-27.71
Mental disorders	500	1,711	0.86	795	696	3,691	3,286	2.93	2.29	-98	-12.35	-405	-10.98	-0.64	-21.97
Total	2,049	1,645	3.37	2,972	2,477	4,306	3,835	11.26	8.15	-495	-16.64	-471	-10.95	-3.11	-27.64

	Indirect Impacts* (US$ Billions)											
	2003	2023										
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	3.79	0.70	0.57	11.85	7.05	0.051	0.041	1.15	0.75	13.75	8.41	-5.35	-38.88
Breast cancer	0.42	0.08	0.07	1.33	0.85	0.006	0.005	0.13	0.09	1.55	1.01	-0.54	-34.85
Colon cancer	0.36	0.06	0.05	1.03	0.61	0.004	0.004	0.10	0.06	1.20	0.73	-0.46	-38.80
Lung cancer	0.55	0.08	0.07	1.43	0.84	0.006	0.005	0.14	0.09	1.66	1.01	-0.65	-39.42
Prostate cancer	0.33	0.07	0.05	1.18	0.67	0.005	0.004	0.11	0.07	1.36	0.80	-0.57	-41.66
Other cancers	2.13	0.41	0.33	6.88	4.08	0.029	0.024	0.67	0.43	7.98	4.86	-3.12	-39.08
Diabetes	1.00	0.34	0.29	2.76	2.16	0.027	0.023	0.29	0.23	3.42	2.71	-0.71	-20.76
Heart disease	0.96	0.63	0.41	2.29	1.25	0.062	0.040	0.22	0.12	3.20	1.82	-1.38	-43.01
Asthma	1.28	0.72	0.62	2.56	2.08	0.052	0.045	0.25	0.20	3.59	2.95	-0.64	-17.74
Hypertension	3.02	1.32	1.07	6.86	5.42	0.130	0.106	0.66	0.53	8.97	7.13	-1.84	-20.55
Stroke	0.23	0.12	0.10	0.52	0.39	0.009	0.007	0.05	0.04	0.69	0.53	-0.16	-23.35
Emotional disturbances	2.82	1.07	0.94	7.78	6.54	0.078	0.068	0.75	0.63	9.68	8.17	-1.50	-15.54
Total	13.10	4.90	4.00	34.62	24.90	0.41	0.33	3.37	2.49	43.30	31.72	-11.58	-26.74

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	14.90	35.63	41.03	43.71	2.68	6.52	50.41	59.18	8.77	17.40
Capital stock (US$ Billions)	73.29	360.32	724.13	750.58	26.45	3.64	2396.88	2630.57	233.69	9.72
Life expectancy at 65 (years)	15.71	18.83	20.59	21.78	1.19	5.77	23.54	25.81	2.27	9.66
GDP* by state (US$ Billions)	18.39	189.96	274.35	293.76	19.41	7.07	516.42	607.41	90.99	17.62

*Based on Real GDP

Connecticut

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	136	4,745	0.65	197	162	8,032	7,410	1.58	1.20	-35	-17.70	-623	-7.75	-0.38	-24.08
Breast cancer	18	5,653	0.10	24	21	9,555	8,803	0.23	0.18	-3	-12.30	-751	-7.86	-0.04	-19.19
Colon cancer	4	10,567	0.04	5	4	19,201	17,697	0.09	0.07	-1	-17.67	-1,505	-7.84	-0.02	-24.12
Lung cancer	5	17,977	0.09	6	5	30,444	28,050	0.17	0.13	-1	-18.44	-2,394	-7.86	-0.04	-24.86
Prostate cancer	14	4,815	0.07	22	17	8,291	7,640	0.18	0.13	-5	-21.48	-651	-7.86	-0.05	-27.65
Other cancers	96	3,717	0.36	140	115	6,449	5,943	0.91	0.68	-25	-18.00	-507	-7.85	-0.22	-24.44
Diabetes	147	2,077	0.31	198	172	3,583	3,302	0.71	0.57	-26	-13.30	-282	-7.86	-0.14	-20.11
Heart disease	224	2,683	0.60	284	186	4,847	4,467	1.38	0.83	-98	-34.63	-380	-7.84	-0.55	-39.75
Pulmonary conditions	611	830	0.51	722	620	1,471	1,356	1.06	0.84	-101	-14.05	-115	-7.85	-0.22	-20.80
Hypertension	434	908	0.39	538	437	1,569	1,446	0.84	0.63	-101	-18.70	-123	-7.86	-0.21	-25.08
Stroke	30	5,213	0.16	34	28	9,558	8,809	0.33	0.25	-6	-18.84	-749	-7.83	-0.08	-25.20
Mental disorders	408	1,740	0.71	558	489	2,982	2,747	1.67	1.34	-69	-12.35	-234	-7.86	-0.32	-19.24
Total	1,991	1,669	3.32	2,531	2,094	3,475	3,203	7.56	5.66	-437	-17.26	-272	-7.84	-1.91	-25.19

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	3.49	0.56	0.46	9.46	5.63	0.040	0.033	0.92	0.60	10.98	6.72	-4.26	-38.80
Breast cancer	0.53	0.08	0.07	1.37	0.87	0.006	0.005	0.13	0.09	1.59	1.03	-0.55	-34.86
Colon cancer	0.23	0.03	0.03	0.55	0.33	0.002	0.002	0.05	0.03	0.63	0.39	-0.25	-38.83
Lung cancer	0.46	0.06	0.05	1.04	0.61	0.004	0.004	0.10	0.06	1.20	0.73	-0.47	-39.43
Prostate cancer	0.36	0.06	0.05	1.09	0.62	0.005	0.004	0.10	0.07	1.26	0.73	-0.52	-41.68
Other cancers	1.91	0.32	0.26	5.43	3.21	0.023	0.019	0.52	0.34	6.30	3.84	-2.46	-39.09
Diabetes	1.12	0.33	0.28	2.67	2.09	0.026	0.022	0.28	0.22	3.30	2.62	-0.69	-20.76
Heart disease	1.23	0.66	0.43	2.40	1.31	0.065	0.042	0.23	0.13	3.35	1.91	-1.44	-43.01
Asthma	1.16	0.60	0.51	2.12	1.72	0.043	0.037	0.21	0.17	2.97	2.44	-0.53	-17.74
Hypertension	3.30	1.30	1.06	6.74	5.33	0.128	0.104	0.65	0.52	8.82	7.01	-1.81	-20.55
Stroke	0.27	0.11	0.09	0.50	0.38	0.008	0.007	0.05	0.04	0.67	0.52	-0.16	-23.35
Emotional disturbances	2.30	0.75	0.66	5.47	4.60	0.055	0.048	0.52	0.44	6.80	5.74	-1.06	-15.54
Total	12.88	4.31	3.49	29.36	21.07	0.36	0.29	2.86	2.11	36.90	26.96	-9.94	-26.94

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	13.70	32.83	38.19	40.67	2.48	6.50	47.02	55.20	8.18	17.40
Capital stock (US$ Billions)	107.37	304.60	526.24	545.39	19.16	3.64	1356.47	1488.73	132.26	9.72
Life expectancy at 65 (years)	15.29	19.43	21.25	22.47	1.22	5.75	24.29	26.64	2.35	9.66
GDP* by state (US$ Billions)	36.05	168.06	232.74	249.15	16.41	7.05	355.58	418.24	62.66	17.62

*Based on Real GDP

Delaware

Direct Costs																
	2003			2023												
				Projections - Level						Projections - Difference						
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	34	5,227	0.18	58	47	11,159	9,916	0.64	0.47	-10	-17.85	-1,243	-11.14	-0.17	-26.99
Breast cancer	3	5,467	0.02	6	5	11,778	10,454	0.07	0.05	-1	-12.30	-1,323	-11.24	-0.01	-22.15
Colon cancer	1	13,590	0.01	1	1	32,529	28,892	0.05	0.03	0	-17.67	-3,637	-11.18	-0.01	-26.87
Lung cancer	1	20,640	0.02	1	1	44,600	39,589	0.07	0.05	0	-18.44	-5,011	-11.23	-0.02	-27.61
Prostate cancer	4	4,230	0.02	7	5	9,362	8,311	0.06	0.04	-1	-21.48	-1,051	-11.22	-0.02	-30.29
Other cancers	25	4,231	0.10	42	35	9,471	8,409	0.40	0.29	-8	-18.00	-1,062	-11.22	-0.11	-27.20
Diabetes	39	2,229	0.09	65	57	4,947	4,392	0.32	0.25	-9	-13.30	-555	-11.22	-0.07	-23.03
Heart disease	58	3,833	0.22	93	61	9,095	8,078	0.84	0.49	-32	-34.63	-1,017	-11.19	-0.35	-41.94
Pulmonary conditions	155	1,017	0.16	206	177	2,346	2,083	0.48	0.37	-29	-14.05	-263	-11.20	-0.11	-23.68
Hypertension	112	1,101	0.12	167	136	2,449	2,174	0.41	0.30	-31	-18.70	-275	-11.22	-0.11	-27.82
Stroke	6	6,716	0.04	9	7	16,285	14,465	0.14	0.10	-2	-18.84	-1,820	-11.17	-0.04	-27.91
Mental disorders	74	1,457	0.11	117	103	3,203	2,844	0.37	0.29	-14	-12.35	-360	-11.23	-0.08	-22.19
Total	479	1,905	0.91	715	588	5,150	4,573	3.22	2.27	-127	-17.82	-577	-11.19	-0.95	-29.59

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	0.86	0.16	0.13	2.78	1.65	0.012	0.010	0.27	0.17	3.22	1.97	-1.25	-38.91
Breast cancer	0.09	0.02	0.01	0.29	0.18	0.001	0.001	0.03	0.02	0.33	0.22	-0.12	-34.85
Colon cancer	0.07	0.01	0.01	0.20	0.12	0.001	0.001	0.02	0.01	0.23	0.14	-0.09	-38.80
Lung cancer	0.11	0.02	0.01	0.29	0.17	0.001	0.001	0.03	0.02	0.33	0.20	-0.13	-39.42
Prostate cancer	0.08	0.02	0.01	0.27	0.15	0.001	0.001	0.03	0.02	0.31	0.18	-0.13	-41.66
Other cancers	0.51	0.10	0.08	1.74	1.03	0.007	0.006	0.17	0.11	2.01	1.23	-0.79	-39.08
Diabetes	0.30	0.11	0.09	0.88	0.69	0.009	0.007	0.09	0.07	1.09	0.86	-0.23	-20.76
Heart disease	0.32	0.21	0.14	0.78	0.43	0.021	0.014	0.08	0.04	1.09	0.62	-0.47	-43.01
Asthma	0.30	0.17	0.15	0.61	0.49	0.012	0.011	0.06	0.05	0.85	0.70	-0.15	-17.74
Hypertension	0.85	0.40	0.33	2.10	1.66	0.040	0.032	0.20	0.16	2.74	2.18	-0.56	-20.55
Stroke	0.06	0.03	0.02	0.13	0.10	0.002	0.002	0.01	0.01	0.17	0.13	-0.04	-23.35
Emotional disturbances	0.42	0.16	0.14	1.15	0.96	0.011	0.010	0.11	0.09	1.43	1.20	-0.22	-15.54
Total	3.10	1.25	1.00	8.41	5.98	0.11	0.09	0.82	0.60	10.59	7.67	-2.92	-27.62

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	13.10	28.73	32.11	34.20	2.09	6.52	39.87	46.81	6.94	17.40
Capital stock (US$ Billions)	20.38	60.60	124.28	128.82	4.54	3.64	363.71	399.17	35.46	9.72
Life expectancy at 65 (years)	14.36	18.51	20.24	21.41	1.17	5.77	23.14	25.38	2.24	9.66
GDP* by state (US$ Billions)	9.18	46.97	81.14	86.88	5.74	7.07	141.67	166.64	24.96	17.62

*Based on Real GDP

Florida

Direct Costs

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	657	4,576	3.01	1,284	1,055	8,826	7,979	11.33	8.42	-229	-17.82	-847	-9.60	-2.91	-25.71
Breast cancer	69	4,852	0.33	121	106	9,336	8,432	1.13	0.90	-15	-12.30	-904	-9.69	-0.24	-20.79
Colon cancer	21	11,652	0.25	34	28	24,533	22,167	0.83	0.62	-6	-17.67	-2,366	-9.64	-0.21	-25.61
Lung cancer	23	18,268	0.42	38	31	35,240	31,827	1.35	0.99	-7	-18.44	-3,413	-9.69	-0.35	-26.34
Prostate cancer	60	3,716	0.22	128	101	7,317	6,609	0.94	0.67	-28	-21.48	-708	-9.68	-0.27	-29.08
Other cancers	484	3,705	1.79	963	789	7,365	6,653	7.09	5.25	-173	-18.00	-712	-9.67	-1.84	-25.93
Diabetes	905	1,957	1.77	1,776	1,540	3,863	3,489	6.86	5.37	-236	-13.30	-374	-9.67	-1.49	-21.69
Heart disease	1,384	3,290	4.52	2,388	1,561	6,876	6,212	16.42	9.70	-827	-34.63	-663	-9.65	-6.72	-40.93
Pulmonary conditions	2,622	880	2.30	4,107	3,530	1,796	1,622	7.38	5.73	-577	-14.05	-173	-9.66	-1.65	-22.36
Hypertension	2,463	967	2.37	4,400	3,577	1,913	1,728	8.41	6.18	-823	-18.70	-185	-9.67	-2.23	-26.56
Stroke	151	5,721	0.87	244	198	12,179	11,005	2.97	2.18	-46	-18.84	-1,174	-9.64	-0.79	-26.67
Mental disorders	2,182	1,285	2.79	4,124	3,615	2,516	2,272	10.38	8.21	-509	-12.35	-243	-9.68	-2.16	-20.83
Total	10,365	1,701	17.63	18,322	15,076	4,009	3,622	63.74	45.79	-3,247	-17.72	-387	-9.66	-17.96	-28.17

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Lost Work Days Optimistic	Presenteeism Baseline	Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Lost Work Days Optimistic	Presenteeism Baseline	Presenteeism Optimistic	Total Projections - Level Baseline	Projections - Level Optimistic	Projections - Difference Absolute	Projections - Difference Percent
Cancer	16.85	3.66	2.99	61.81	36.74	0.26	0.22	5.98	3.89	71.71	43.83	-27.88	-38.88
Breast cancer	1.86	0.36	0.32	6.17	3.91	0.03	0.02	0.60	0.41	7.15	4.66	-2.49	-34.84
Colon cancer	1.38	0.27	0.22	4.51	2.69	0.02	0.02	0.44	0.28	5.24	3.21	-2.03	-38.80
Lung cancer	2.36	0.43	0.35	7.34	4.32	0.03	0.03	0.71	0.46	8.51	5.16	-3.35	-39.41
Prostate cancer	1.24	0.30	0.24	5.12	2.91	0.02	0.02	0.50	0.31	5.94	3.47	-2.48	-41.66
Other cancers	10.01	2.29	1.86	38.67	22.91	0.16	0.13	3.74	2.42	44.87	27.34	-17.53	-39.07
Diabetes	6.90	2.93	2.54	23.91	18.75	0.23	0.20	2.55	1.98	29.62	23.47	-6.15	-20.76
Heart disease	7.56	5.54	3.62	20.15	11.02	0.54	0.36	1.95	1.07	28.18	16.06	-12.12	-43.01
Asthma	4.99	3.39	2.91	12.07	9.80	0.25	0.21	1.17	0.95	16.87	13.88	-2.99	-17.74
Hypertension	18.73	10.62	8.63	55.15	43.61	1.04	0.85	5.35	4.23	72.16	57.33	-14.83	-20.55
Stroke	1.38	0.82	0.66	3.56	2.69	0.06	0.05	0.35	0.26	4.78	3.67	-1.12	-23.35
Emotional disturbances	12.29	5.55	4.87	40.40	33.95	0.40	0.35	3.88	3.26	50.23	42.43	-7.80	-15.54
Total	68.71	32.50	26.22	217.04	156.56	2.79	2.23	21.22	15.64	273.56	200.66	-72.90	-26.65

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	10.30	25.37	29.28	31.18	1.90	6.49	36.20	42.49	6.29	17.38
Capital stock (US$ Billions)	199.45	1088.61	2766.24	2866.87	100.63	3.64	12451.75	13664.42	1212.67	9.72
Life expectancy at 65 (years)	16.07	19.74	21.59	22.83	1.24	5.74	24.68	27.06	2.38	9.65
GDP* by state (US$ Billions)	70.46	553.94	1159.87	1239.01	79.13	6.82	3009.00	3540.33	531.33	17.66

*Based on Real GDP

Georgia

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	345	3,963	1.37	624	512	7,473	6,775	4.66	3.47	-111	-17.84	-699	-9.35	-1.19	-25.52
Breast cancer	36	4,090	0.15	61	54	7,727	6,999	0.47	0.38	-8	-12.30	-729	-9.43	-0.10	-20.57
Colon cancer	11	10,490	0.12	16	13	21,634	19,602	0.35	0.26	-3	-17.67	-2,032	-9.39	-0.09	-25.40
Lung cancer	12	15,576	0.19	18	15	29,502	26,719	0.54	0.40	-3	-18.44	-2,783	-9.43	-0.14	-26.14
Prostate cancer	37	3,198	0.12	70	55	6,180	5,598	0.43	0.31	-15	-21.48	-582	-9.42	-0.13	-28.88
Other cancers	249	3,208	0.80	457	375	6,257	5,668	2.86	2.13	-82	-18.00	-589	-9.42	-0.74	-25.73
Diabetes	427	1,688	0.72	692	600	3,269	2,961	2.26	1.78	-92	-13.30	-308	-9.42	-0.49	-21.47
Heart disease	494	2,956	1.45	769	503	6,053	5,485	4.65	2.76	-266	-34.63	-569	-9.40	-1.90	-40.77
Pulmonary conditions	1,549	778	1.20	2,225	1,913	1,556	1,410	3.46	2.70	-313	-14.05	-146	-9.41	-0.77	-22.14
Hypertension	1,212	832	1.00	1,818	1,478	1,614	1,462	2.93	2.16	-340	-18.70	-152	-9.42	-0.77	-26.36
Stroke	66	5,218	0.34	92	75	10,878	9,856	1.01	0.74	-17	-18.84	-1,021	-9.39	-0.27	-26.46
Mental disorders	930	1,100	1.02	1,571	1,377	2,114	1,914	3.32	2.64	-194	-12.35	-199	-9.43	-0.68	-20.61
Total	5,023	1,415	7.11	7,791	6,458	3,323	3,010	22.30	16.24	-1,333	-17.11	-312	-9.40	-6.06	-27.19

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	8.85	1.78	1.45	30.02	17.83	0.128	0.105	2.90	1.89	34.82	21.28	-13.55	-38.90
Breast cancer	0.95	0.18	0.16	3.05	1.93	0.013	0.011	0.29	0.20	3.54	2.31	-1.23	-34.84
Colon cancer	0.76	0.13	0.11	2.27	1.35	0.010	0.008	0.22	0.14	2.64	1.61	-1.02	-38.80
Lung cancer	1.24	0.20	0.17	3.46	2.04	0.015	0.012	0.33	0.22	4.01	2.43	-1.58	-39.41
Prostate cancer	0.75	0.17	0.13	2.80	1.59	0.012	0.009	0.27	0.17	3.25	1.90	-1.35	-41.66
Other cancers	5.15	1.09	0.89	18.44	10.92	0.079	0.064	1.78	1.16	21.39	13.03	-8.36	-39.07
Diabetes	3.26	1.14	0.99	9.32	7.31	0.091	0.079	0.99	0.77	11.55	9.15	-2.40	-20.76
Heart disease	2.70	1.78	1.17	6.49	3.55	0.175	0.114	0.63	0.34	9.07	5.17	-3.90	-43.01
Asthma	2.95	1.84	1.58	6.54	5.31	0.133	0.115	0.63	0.52	9.14	7.52	-1.62	-17.74
Hypertension	9.21	4.39	3.57	22.79	18.02	0.431	0.351	2.21	1.75	29.82	23.69	-6.13	-20.55
Stroke	0.60	0.31	0.25	1.35	1.02	0.023	0.018	0.13	0.10	1.81	1.39	-0.42	-23.35
Emotional disturbances	5.24	2.12	1.85	15.39	12.94	0.154	0.134	1.48	1.24	19.14	16.16	-2.97	-15.54
Total	32.82	13.35	10.86	91.89	65.98	1.14	0.92	8.98	6.61	115.35	84.36	-30.99	-26.87

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	9.20	24.73	28.39	30.24	1.85	6.52	35.16	41.26	6.10	17.36
Capital stock (US$ Billions)	138.02	611.51	1288.66	1335.73	47.07	3.64	4232.31	4643.82	411.51	9.72
Life expectancy at 65 (years)	14.70	17.33	18.95	20.04	1.09	5.77	21.67	23.76	2.09	9.64
GDP* by state (US$ Billions)	44.98	318.94	541.05	579.31	38.26	7.07	1006.61	1183.48	176.88	17.57

*Based on Real GDP

Hawaii

Direct Costs	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	38	4,358	0.16	59	49	7,319	6,755	0.43	0.33	-10	-17.68	-564	-7.70	-0.10	-24.02
Breast cancer	4	4,613	0.02	6	5	7,742	7,141	0.05	0.04	-1	-12.30	-601	-7.76	-0.01	-19.11
Colon cancer	2	12,342	0.02	2	2	22,246	20,525	0.05	0.04	0	-17.67	-1,721	-7.74	-0.01	-24.04
Lung cancer	1	16,713	0.02	2	1	28,102	25,921	0.05	0.04	0	-18.44	-2,182	-7.76	-0.01	-24.78
Prostate cancer	3	3,925	0.01	5	4	6,709	6,189	0.03	0.02	-1	-21.48	-520	-7.76	-0.01	-27.57
Other cancers	28	3,307	0.09	44	36	5,696	5,254	0.25	0.19	-8	-18.00	-442	-7.75	-0.06	-24.36
Diabetes	58	2,015	0.12	86	75	3,451	3,184	0.30	0.24	-11	-13.30	-268	-7.76	-0.06	-20.02
Heart disease	66	3,668	0.24	95	62	6,572	6,063	0.62	0.38	-33	-34.63	-509	-7.74	-0.25	-39.68
Pulmonary conditions	124	915	0.11	158	136	1,609	1,484	0.25	0.20	-22	-14.05	-125	-7.75	-0.05	-20.71
Hypertension	128	897	0.11	165	134	1,538	1,419	0.25	0.19	-31	-18.70	-119	-7.76	-0.06	-25.00
Stroke	10	6,303	0.06	14	11	11,461	10,575	0.16	0.12	-3	-18.84	-886	-7.73	-0.04	-25.12
Mental disorders	139	1,774	0.25	209	183	3,018	2,784	0.63	0.51	-26	-12.35	-234	-7.76	-0.12	-19.15
Total	564	1,896	1.07	785	649	3,784	3,491	2.65	1.96	-136	-17.33	-293	-7.74	-0.69	-25.94

Indirect Impacts* (US$ Billions)	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	0.97	0.17	0.14	2.85	1.70	0.0122	0.0099	0.28	0.18	3.31	2.02	-1.28	-38.78
Breast cancer	0.11	0.02	0.02	0.32	0.20	0.0014	0.0012	0.03	0.02	0.37	0.24	-0.13	-34.82
Colon cancer	0.13	0.02	0.02	0.34	0.20	0.0014	0.0012	0.03	0.02	0.39	0.24	-0.15	-38.80
Lung cancer	0.13	0.02	0.02	0.33	0.20	0.0014	0.0011	0.03	0.02	0.39	0.23	-0.15	-39.39
Prostate cancer	0.06	0.01	0.01	0.21	0.12	0.0009	0.0007	0.02	0.01	0.24	0.14	-0.10	-41.64
Other cancers	0.54	0.10	0.08	1.65	0.98	0.0070	0.0057	0.16	0.10	1.91	1.17	-0.75	-39.06
Diabetes	0.45	0.14	0.12	1.16	0.91	0.0113	0.0097	0.12	0.10	1.43	1.14	-0.30	-20.76
Heart disease	0.36	0.22	0.14	0.80	0.44	0.0216	0.0141	0.08	0.04	1.12	0.64	-0.48	-43.01
Asthma	0.24	0.13	0.11	0.46	0.38	0.0095	0.0082	0.05	0.04	0.65	0.53	-0.12	-17.74
Hypertension	0.97	0.40	0.32	2.06	1.63	0.0391	0.0318	0.20	0.16	2.70	2.15	-0.56	-20.55
Stroke	0.09	0.05	0.04	0.20	0.15	0.0033	0.0027	0.02	0.01	0.27	0.21	-0.06	-23.35
Emotional disturbances	0.78	0.28	0.25	2.04	1.72	0.0204	0.0178	0.20	0.16	2.54	2.15	-0.39	-15.54
Total	3.86	1.38	1.12	9.58	6.92	0.12	0.09	0.94	0.69	12.02	8.83	-3.19	-26.53

* Based on Nominal GDP

Intergenerational Impacts			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	14.00	27.23	31.31	33.34	2.03	6.50	39.55	46.40	6.85	17.33
Capital stock (US$ Billions)	42.85	83.08	152.22	157.76	5.54	3.64	456.09	500.37	44.28	9.72
Life expectancy at 65 (years)	16.23	21.03	23.00	24.32	1.32	5.75	26.30	28.83	2.53	9.62
GDP* by state (US$ Billions)	12.57	48.65	82.80	88.64	5.84	7.05	156.35	183.78	27.43	17.54

*Based on Real GDP

Idaho

Direct Costs	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	46	3,312	0.15	82	67	7,464	6,577	0.61	0.44	-15	-17.85	-888	-11.89	-0.17	-27.62
Breast cancer	5	3,546	0.02	8	7	8,067	7,101	0.06	0.05	-1	-12.30	-966	-11.97	-0.01	-22.80
Colon cancer	2	9,313	0.01	2	2	23,710	20,887	0.05	0.04	0	-17.67	-2,823	-11.91	-0.01	-27.47
Lung cancer	2	12,727	0.02	2	2	29,043	25,568	0.07	0.05	0	-18.44	-3,476	-11.97	-0.02	-28.21
Prostate cancer	4	2,990	0.01	9	7	7,002	6,165	0.06	0.04	-2	-21.48	-837	-11.95	-0.02	-30.86
Other cancers	34	2,513	0.08	60	49	5,956	5,244	0.36	0.26	-11	-18.00	-712	-11.95	-0.10	-27.80
Diabetes	53	1,646	0.09	107	93	3,865	3,403	0.41	0.32	-14	-13.30	-462	-11.95	-0.10	-23.66
Heart disease	69	2,798	0.19	118	77	7,057	6,216	0.83	0.48	-41	-34.63	-841	-11.91	-0.35	-42.41
Pulmonary conditions	192	724	0.14	280	241	1,772	1,560	0.50	0.38	-39	-14.05	-211	-11.93	-0.12	-24.31
Hypertension	139	747	0.10	225	183	1,758	1,547	0.40	0.28	-42	-18.70	-210	-11.95	-0.11	-28.41
Stroke	10	4,773	0.05	16	13	12,320	10,854	0.19	0.14	-3	-18.84	-1,466	-11.90	-0.06	-28.50
Mental disorders	136	1,440	0.20	235	206	3,347	2,946	0.79	0.61	-29	-12.35	-400	-11.96	-0.18	-22.83
Total	646	1,424	0.92	1,063	880	3,959	3,487	3.73	2.64	-183	-17.23	-472	-11.93	-1.09	-29.17

Indirect Impacts* (US$ Billions)	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	1.18	0.23	0.19	3.95	2.35	0.017	0.014	0.38	0.25	4.59	2.80	-1.78	-38.91
Breast cancer	0.13	0.02	0.02	0.41	0.26	0.002	0.002	0.04	0.03	0.47	0.31	-0.17	-34.84
Colon cancer	0.11	0.02	0.02	0.35	0.21	0.002	0.001	0.03	0.02	0.41	0.25	-0.16	-38.78
Lung cancer	0.16	0.03	0.02	0.46	0.27	0.002	0.002	0.04	0.03	0.54	0.32	-0.21	-39.40
Prostate cancer	0.10	0.02	0.02	0.42	0.24	0.002	0.001	0.04	0.02	0.48	0.28	-0.20	-41.65
Other cancers	0.67	0.14	0.11	2.32	1.37	0.010	0.008	0.22	0.15	2.69	1.64	-1.05	-39.06
Diabetes	0.41	0.18	0.15	1.44	1.13	0.014	0.012	0.15	0.12	1.79	1.42	-0.37	-20.76
Heart disease	0.38	0.27	0.18	1.00	0.55	0.027	0.018	0.10	0.05	1.39	0.79	-0.60	-43.01
Asthma	0.37	0.23	0.20	0.82	0.67	0.017	0.014	0.08	0.06	1.15	0.95	-0.20	-17.74
Hypertension	1.06	0.54	0.44	2.82	2.23	0.053	0.043	0.27	0.22	3.69	2.93	-0.76	-20.55
Stroke	0.09	0.05	0.04	0.23	0.17	0.004	0.003	0.02	0.02	0.31	0.24	-0.07	-23.35
Emotional disturbances	0.76	0.32	0.28	2.30	1.93	0.023	0.020	0.22	0.19	2.86	2.42	-0.44	-15.54
Total	4.25	1.83	1.48	12.57	9.03	0.15	0.12	1.23	0.90	15.78	11.54	-4.23	-26.84

* Based on Nominal GDP

Intergenerational Impacts			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	10.00	21.53	25.86	27.55	1.69	6.54	32.57	38.24	5.67	17.40
Capital stock (US$ Billions)	22.16	63.24	186.60	193.43	6.83	3.64	680.49	746.83	66.34	9.72
Life expectancy at 65 (years)	15.67	18.75	20.50	21.69	1.19	5.78	23.44	25.70	2.26	9.66
GDP* by state (US$ Billions)	4.69	40.35	69.79	74.74	4.95	7.09	150.60	177.13	26.54	17.62

*Based on Real GDP

Illinois

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	445	4,831	2.15	630	518	8,471	7,765	5.33	4.02	-112	-17.82	-706	-8.34	-1.32	-24.67
Breast cancer	48	4,892	0.24	62	55	8,560	7,845	0.53	0.43	-8	-12.30	-715	-8.36	-0.10	-19.63
Colon cancer	13	11,729	0.16	15	13	22,168	20,323	0.34	0.25	-3	-17.67	-1,845	-8.32	-0.08	-24.52
Lung cancer	14	16,377	0.23	17	14	28,716	26,317	0.48	0.36	-3	-18.44	-2,399	-8.35	-0.12	-25.26
Prostate cancer	44	4,528	0.20	68	54	8,081	7,406	0.55	0.40	-15	-21.48	-675	-8.35	-0.15	-28.03
Other cancers	325	4,085	1.33	468	383	7,350	6,737	3.44	2.58	-84	-18.00	-613	-8.34	-0.85	-24.85
Diabetes	540	2,080	1.12	704	611	3,719	3,409	2.62	2.08	-94	-13.30	-310	-8.35	-0.54	-20.53
Heart disease	851	3,879	3.30	1,021	668	7,284	6,678	7.44	4.46	-354	-34.63	-607	-8.33	-2.98	-40.07
Pulmonary conditions	2,116	1,092	2.32	2,470	2,123	2,009	1,842	4.96	3.91	-347	-14.05	-167	-8.34	-1.05	-21.22
Hypertension	1,570	817	1.28	1,916	1,558	1,463	1,341	2.80	2.09	-358	-18.70	-122	-8.35	-0.71	-25.48
Stroke	113	5,008	0.56	124	101	9,554	8,759	1.19	0.88	-23	-18.84	-795	-8.32	-0.30	-25.60
Mental disorders	1,143	1,559	1.77	1,541	1,351	2,768	2,537	4.27	3.43	-190	-12.35	-231	-8.35	-0.84	-19.67
Total	6,778	1,846	12.51	8,407	6,928	3,928	3,600	28.61	20.87	-1,479	-17.59	-327	-8.34	-7.75	-27.07

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	11.39	1.79	1.47	30.32	18.02	0.129	0.106	2.93	1.91	35.17	21.49	-13.68	-38.89
Breast cancer	1.24	0.18	0.16	3.03	1.92	0.013	0.011	0.29	0.20	3.51	2.29	-1.22	-34.79
Colon cancer	0.82	0.11	0.09	1.91	1.14	0.008	0.007	0.19	0.12	2.22	1.36	-0.86	-38.77
Lung cancer	1.23	0.16	0.13	2.72	1.60	0.012	0.009	0.26	0.17	3.15	1.91	-1.24	-39.36
Prostate cancer	1.06	0.19	0.14	3.13	1.78	0.013	0.010	0.30	0.19	3.63	2.12	-1.51	-41.61
Other cancers	7.03	1.16	0.94	19.53	11.58	0.083	0.068	1.89	1.23	22.66	13.81	-8.84	-39.03
Diabetes	4.12	1.16	1.01	9.48	7.43	0.093	0.080	1.01	0.79	11.74	9.31	-2.44	-20.76
Heart disease	4.65	2.37	1.55	8.62	4.71	0.233	0.152	0.83	0.46	12.05	6.87	-5.18	-43.01
Asthma	4.03	2.04	1.75	7.26	5.90	0.148	0.127	0.70	0.57	10.15	8.35	-1.80	-17.74
Hypertension	11.94	4.63	3.76	24.02	19.00	0.454	0.370	2.33	1.84	31.43	24.97	-6.46	-20.55
Stroke	1.03	0.42	0.34	1.82	1.38	0.030	0.024	0.18	0.13	2.44	1.87	-0.57	-23.35
Emotional disturbances	6.44	2.07	1.82	15.10	12.69	0.151	0.132	1.45	1.22	18.77	15.85	-2.92	-15.54
Total	43.60	14.48	11.69	96.61	69.12	1.24	0.99	9.44	6.91	121.76	88.72	-33.05	-27.14

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	10.30	27.37	31.84	33.92	2.08	6.54	39.17	45.97	6.80	17.36
Capital stock (US$ Billions)	385.93	981.67	1634.70	1694.60	59.89	3.64	4398.07	4825.79	427.72	9.72
Life expectancy at 65 (years)	14.63	18.33	20.04	21.20	1.16	5.78	22.92	25.13	2.21	9.64
GDP* by state (US$ Billions)	105.60	499.49	678.06	726.16	48.10	7.09	1072.18	1260.62	188.44	17.58

*Based on Real GDP

Indiana

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	208	4,831	1.01	307	253	8,989	8,175	2.76	2.07	-55	-17.78	-814	-9.06	-0.70	-25.22
Breast cancer	23	4,871	0.11	30	26	8,967	8,154	0.27	0.21	-4	-12.30	-813	-9.07	-0.05	-20.25
Colon cancer	6	11,867	0.08	7	6	23,761	21,615	0.18	0.13	-1	-17.67	-2,146	-9.03	-0.04	-25.11
Lung cancer	8	16,282	0.12	9	7	30,044	27,320	0.28	0.20	-2	-18.44	-2,725	-9.07	-0.07	-25.84
Prostate cancer	18	4,524	0.08	28	22	8,509	7,738	0.24	0.17	-6	-21.48	-771	-9.06	-0.07	-28.59
Other cancers	154	4,085	0.63	233	191	7,753	7,051	1.81	1.35	-42	-18.00	-702	-9.06	-0.46	-25.43
Diabetes	283	2,185	0.62	379	329	4,119	3,746	1.56	1.23	-50	-13.30	-373	-9.06	-0.33	-21.15
Heart disease	441	3,952	1.74	538	352	7,859	7,149	4.23	2.52	-186	-34.63	-710	-9.04	-1.72	-40.53
Pulmonary conditions	1,135	1,134	1.29	1,402	1,205	2,205	2,006	3.09	2.42	-197	-14.05	-200	-9.05	-0.67	-21.83
Hypertension	862	869	0.75	1,073	873	1,641	1,492	1.76	1.30	-201	-18.70	-149	-9.06	-0.46	-26.06
Stroke	59	5,106	0.30	67	54	10,330	9,397	0.69	0.51	-13	-18.84	-933	-9.03	-0.18	-26.17
Mental disorders	624	1,625	1.01	861	755	3,040	2,765	2.62	2.09	-106	-12.35	-276	-9.06	-0.53	-20.29
Total	3,612	1,863	6.73	4,628	3,820	4,114	3,742	16.72	12.13	-808	-17.46	-372	-9.05	-4.59	-27.45

Direct Costs

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	5.34	0.87	0.72	14.79	8.80	0.063	0.052	1.43	0.93	17.16	10.49	-6.67	-38.85
Breast cancer	0.58	0.08	0.07	1.43	0.90	0.006	0.005	0.14	0.10	1.66	1.08	-0.58	-34.79
Colon cancer	0.39	0.06	0.05	0.94	0.56	0.004	0.003	0.09	0.06	1.09	0.67	-0.42	-38.76
Lung cancer	0.65	0.09	0.07	1.47	0.87	0.006	0.005	0.14	0.09	1.71	1.04	-0.67	-39.36
Prostate cancer	0.42	0.08	0.06	1.28	0.73	0.005	0.004	0.12	0.08	1.49	0.87	-0.62	-41.61
Other cancers	3.30	0.57	0.47	9.67	5.74	0.041	0.034	0.94	0.61	11.22	6.84	-4.38	-39.02
Diabetes	2.16	0.63	0.54	5.11	4.01	0.050	0.043	0.54	0.42	6.33	5.01	-1.31	-20.76
Heart disease	2.41	1.25	0.82	4.54	2.48	0.123	0.080	0.44	0.24	6.35	3.62	-2.73	-43.01
Asthma	2.16	1.16	0.99	4.12	3.35	0.084	0.072	0.40	0.32	5.76	4.74	-1.02	-17.74
Hypertension	6.55	2.59	2.11	13.45	10.64	0.254	0.207	1.30	1.03	17.60	13.99	-3.62	-20.55
Stroke	0.54	0.22	0.18	0.98	0.74	0.016	0.013	0.10	0.07	1.31	1.00	-0.31	-23.35
Emotional disturbances	3.52	1.16	1.02	8.43	7.09	0.084	0.074	0.81	0.68	10.49	8.86	-1.63	-15.54
Total	22.68	7.88	6.37	51.43	37.10	0.67	0.54	5.02	3.70	65.01	47.72	-17.29	-26.60

Indirect Impacts* (US$ Billions)

* Based on Nominal GDP

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	8.30	22.37	25.05	26.68	1.63	6.50	30.96	36.33	5.37	17.33
Capital stock (US$ Billions)	146.24	372.06	715.67	741.72	26.05	3.64	1931.92	2119.54	187.62	9.72
Life expectancy at 65 (years)	14.73	17.72	19.38	20.49	1.11	5.75	22.16	24.29	2.13	9.62
GDP* by state (US$ Billions)	41.75	213.12	305.94	327.50	21.56	7.05	469.17	551.51	82.34	17.55

Intergenerational Impacts

*Based on Real GDP

Iowa

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Direct Costs															
Cancer	101	4,667	0.47	141	116	8,876	8,031	1.25	0.93	-25	-17.81	-845	-9.52	-0.32	-25.64
Breast cancer	11	4,619	0.05	14	12	8,792	7,954	0.12	0.10	-2	-12.30	-838	-9.54	-0.03	-20.66
Colon cancer	3	11,667	0.04	3	3	24,265	21,961	0.08	0.06	-1	-17.67	-2,304	-9.50	-0.02	-25.49
Lung cancer	3	15,741	0.05	3	3	30,037	27,173	0.10	0.07	-1	-18.44	-2,864	-9.54	-0.03	-26.22
Prostate cancer	10	4,357	0.04	15	12	8,485	7,676	0.13	0.09	-3	-21.48	-808	-9.53	-0.04	-28.96
Other cancers	73	3,947	0.29	105	86	7,757	7,019	0.81	0.60	-19	-18.00	-739	-9.52	-0.21	-25.81
Diabetes	115	2,053	0.24	159	137	4,006	3,625	0.64	0.50	-21	-13.30	-382	-9.52	-0.14	-21.56
Heart disease	224	3,867	0.86	267	175	7,984	7,226	2.13	1.26	-92	-34.63	-758	-9.50	-0.87	-40.84
Pulmonary conditions	412	1,085	0.45	488	420	2,188	1,980	1.07	0.83	-69	-14.05	-208	-9.51	-0.24	-22.23
Hypertension	380	806	0.31	457	371	1,576	1,426	0.72	0.53	-85	-18.70	-150	-9.52	-0.19	-26.44
Stroke	34	5,043	0.17	38	31	10,604	9,597	0.40	0.29	-7	-18.84	-1,006	-9.49	-0.11	-26.55
Mental disorders	319	1,527	0.48	418	366	2,956	2,674	1.24	0.98	-52	-12.35	-282	-9.53	-0.26	-20.70
Total	1,585	1,880	2.98	1,967	1,616	4,329	3,917	7.44	5.32	-351	-17.86	-412	-9.51	-2.12	-28.46

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	2.58	0.40	0.33	6.78	4.03	0.029	0.024	0.66	0.43	7.87	4.81	-3.06	-38.88
Breast cancer	0.29	0.04	0.03	0.67	0.43	0.003	0.002	0.06	0.05	0.78	0.51	-0.27	-34.79
Colon cancer	0.20	0.03	0.02	0.46	0.27	0.002	0.002	0.04	0.03	0.53	0.33	-0.21	-38.76
Lung cancer	0.25	0.03	0.03	0.54	0.32	0.002	0.002	0.05	0.03	0.63	0.38	-0.25	-39.36
Prostate cancer	0.23	0.04	0.03	0.70	0.40	0.003	0.002	0.07	0.04	0.81	0.47	-0.34	-41.61
Other cancers	1.60	0.26	0.21	4.41	2.62	0.019	0.015	0.43	0.28	5.12	3.12	-2.00	-39.02
Diabetes	0.88	0.26	0.23	2.13	1.67	0.021	0.018	0.23	0.18	2.64	2.10	-0.55	-20.76
Heart disease	1.22	0.62	0.41	2.25	1.23	0.061	0.040	0.22	0.12	3.15	1.80	-1.36	-43.01
Asthma	0.78	0.40	0.35	1.43	1.17	0.029	0.025	0.14	0.11	2.01	1.65	-0.36	-17.74
Hypertension	2.89	1.10	0.90	5.73	4.53	0.108	0.088	0.56	0.44	7.49	5.95	-1.54	-20.55
Stroke	0.31	0.13	0.10	0.55	0.42	0.009	0.007	0.05	0.04	0.74	0.57	-0.17	-23.35
Emotional disturbances	1.80	0.56	0.49	4.10	3.44	0.041	0.036	0.39	0.33	5.09	4.30	-0.79	-15.54
Total	10.46	3.48	2.80	22.98	16.49	0.30	0.24	2.24	1.65	29.00	21.17	-7.82	-26.98

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	9.10	23.87	27.82	29.63	1.81	6.49	34.32	40.29	5.97	17.40
Capital stock (US$ Billions)	76.45	190.08	336.75	348.99	12.25	3.64	814.49	893.91	79.41	9.72
Life expectancy at 65 (years)	15.59	18.99	20.77	21.96	1.19	5.74	23.74	26.03	2.29	9.66
GDP* by state (US$ Billions)	18.83	100.36	139.23	149.03	9.80	7.04	200.45	235.77	35.32	17.62

*Based on Real GDP

Kansas

Direct Costs																
	2003			2023												
				Projections - Level						Projections - Difference						
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)		
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent	
Cancer	87	4,706	0.41	128	105	8,945	8,101	1.14	0.85	-23	-17.80	-844	-9.44	-0.29	-25.56	
Breast cancer	10	4,944	0.05	14	12	9,375	8,486	0.13	0.10	-2	-12.30	-889	-9.48	-0.03	-20.61	
Colon cancer	2	10,933	0.03	3	2	22,639	20,501	0.06	0.05	-1	-17.67	-2,138	-9.44	-0.02	-25.44	
Lung cancer	3	16,050	0.04	3	3	30,508	27,615	0.09	0.07	-1	-18.44	-2,892	-9.48	-0.02	-26.18	
Prostate cancer	9	4,440	0.04	15	12	8,610	7,795	0.13	0.09	-3	-21.48	-816	-9.47	-0.04	-28.92	
Other cancers	62	3,980	0.25	92	76	7,791	7,053	0.72	0.53	-17	-18.00	-738	-9.47	-0.19	-25.77	
Diabetes	96	2,062	0.20	132	115	4,009	3,630	0.53	0.42	-18	-13.30	-380	-9.47	-0.11	-21.51	
Heart disease	185	3,630	0.67	234	153	7,463	6,758	1.75	1.04	-81	-34.63	-705	-9.45	-0.71	-40.80	
Pulmonary conditions	462	1,052	0.49	555	477	2,113	1,913	1.17	0.91	-78	-14.05	-200	-9.46	-0.26	-22.18	
Hypertension	327	821	0.27	411	334	1,598	1,447	0.66	0.48	-77	-18.70	-151	-9.47	-0.17	-26.40	
Stroke	29	4,595	0.13	34	27	9,618	8,710	0.33	0.24	-6	-18.84	-908	-9.44	-0.09	-26.50	
Mental disorders	308	1,555	0.48	424	372	2,998	2,714	1.27	1.01	-52	-12.35	-284	-9.47	-0.26	-20.65	
Total	1,494	1,770	2.64	1,917	1,582	4,047	3,665	6.84	4.94	-335	-17.47	-383	-9.46	-1.90	-27.78	

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	2.24	0.36	0.30	6.14	3.65	0.026	0.021	0.59	0.39	7.12	4.35	-2.77	-38.87
Breast cancer	0.28	0.04	0.04	0.70	0.44	0.003	0.003	0.07	0.05	0.81	0.53	-0.28	-34.81
Colon cancer	0.15	0.02	0.02	0.35	0.21	0.001	0.001	0.03	0.02	0.40	0.25	-0.16	-38.78
Lung cancer	0.23	0.03	0.02	0.51	0.30	0.002	0.002	0.05	0.03	0.59	0.36	-0.23	-39.38
Prostate cancer	0.23	0.04	0.03	0.71	0.40	0.003	0.002	0.07	0.04	0.82	0.48	-0.34	-41.63
Other cancers	1.36	0.23	0.19	3.87	2.30	0.017	0.013	0.37	0.24	4.50	2.74	-1.76	-39.05
Diabetes	0.73	0.22	0.19	1.78	1.39	0.017	0.015	0.19	0.15	2.20	1.75	-0.46	-20.76
Heart disease	1.01	0.54	0.36	1.98	1.08	0.053	0.035	0.19	0.10	2.77	1.58	-1.19	-43.01
Asthma	0.88	0.46	0.39	1.63	1.32	0.033	0.029	0.16	0.13	2.28	1.87	-0.40	-17.74
Hypertension	2.49	0.99	0.81	5.15	4.07	0.097	0.079	0.50	0.39	6.74	5.35	-1.38	-20.55
Stroke	0.26	0.11	0.09	0.49	0.37	0.008	0.007	0.05	0.04	0.66	0.51	-0.16	-23.35
Emotional disturbances	1.73	0.57	0.50	4.15	3.49	0.041	0.036	0.40	0.33	5.17	4.36	-0.80	-15.54
Total	9.34	3.26	2.63	21.32	15.39	0.28	0.22	2.08	1.53	26.94	19.77	-7.16	-26.59

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	11.40	29.33	35.00	37.28	2.28	6.52	42.74	50.17	7.43	17.38
Capital stock (US$ Billions)	56.95	174.93	334.65	346.86	12.22	3.64	903.85	991.87	88.01	9.72
Life expectancy at 65 (years)	15.79	18.50	20.23	21.40	1.17	5.76	23.13	25.36	2.23	9.65
GDP* by state (US$ Billions)	16.35	92.73	140.70	150.65	9.95	7.07	223.97	263.39	39.41	17.60

*Based on Real GDP

Kentucky

Direct Costs

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	173	4,599	0.80	268	220	9,716	8,680	2.60	1.91	-48	-17.84	-1,036	-10.66	-0.69	-26.60
Breast cancer	17	4,719	0.08	23	20	9,788	8,738	0.23	0.18	-3	-12.30	-1,049	-10.72	-0.05	-21.70
Colon cancer	6	12,307	0.07	7	6	28,215	25,205	0.20	0.15	-1	-17.67	-3,010	-10.67	-0.05	-26.45
Lung cancer	8	18,102	0.14	9	8	37,653	33,617	0.35	0.25	-2	-18.44	-4,036	-10.72	-0.09	-27.19
Prostate cancer	15	3,710	0.06	25	20	7,896	7,050	0.20	0.14	-5	-21.48	-845	-10.71	-0.06	-29.89
Other cancers	128	3,723	0.48	203	167	8,007	7,151	1.63	1.19	-37	-18.00	-857	-10.70	-0.44	-26.78
Diabetes	219	2,057	0.45	308	267	4,389	3,920	1.35	1.05	-41	-13.30	-470	-10.70	-0.31	-22.58
Heart disease	325	3,494	1.13	424	277	7,945	7,097	3.37	1.97	-147	-34.63	-848	-10.67	-1.40	-41.60
Pulmonary conditions	1,020	935	0.95	1,303	1,119	2,070	1,849	2.70	2.07	-183	-14.05	-221	-10.69	-0.63	-23.24
Hypertension	607	1,022	0.62	775	630	2,185	1,951	1.69	1.23	-145	-18.70	-234	-10.70	-0.46	-27.40
Stroke	37	6,178	0.23	44	36	14,340	12,811	0.64	0.46	-8	-18.84	-1,529	-10.66	-0.18	-27.50
Mental disorders	378	1,332	0.50	532	466	2,817	2,515	1.50	1.17	-66	-12.35	-302	-10.71	-0.33	-21.74
Total	2,760	1,702	4.70	3,655	3,017	4,358	3,892	13.85	9.86	-638	-17.45	-466	-10.69	-3.99	-28.82

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	4.44	0.76	0.62	12.89	7.66	0.055	0.045	1.25	0.81	14.96	9.14	-5.82	-38.90
Breast cancer	0.42	0.07	0.06	1.12	0.71	0.005	0.004	0.11	0.08	1.30	0.85	-0.45	-34.82
Colon cancer	0.40	0.06	0.05	1.01	0.60	0.004	0.004	0.10	0.06	1.17	0.71	-0.45	-38.78
Lung cancer	0.74	0.10	0.08	1.72	1.01	0.007	0.006	0.17	0.11	2.00	1.21	-0.79	-39.39
Prostate cancer	0.31	0.06	0.05	0.98	0.56	0.004	0.003	0.09	0.06	1.14	0.66	-0.47	-41.64
Other cancers	2.58	0.48	0.39	8.06	4.78	0.034	0.028	0.78	0.51	9.35	5.70	-3.65	-39.05
Diabetes	1.67	0.51	0.44	4.15	3.26	0.041	0.035	0.44	0.34	5.14	4.08	-1.07	-20.76
Heart disease	1.78	0.98	0.64	3.58	1.96	0.097	0.063	0.35	0.19	5.01	2.85	-2.15	-43.01
Asthma	1.94	1.08	0.92	3.83	3.11	0.078	0.067	0.37	0.30	5.35	4.40	-0.95	-17.74
Hypertension	4.61	1.87	1.52	9.71	7.68	0.184	0.150	0.94	0.74	12.71	10.10	-2.61	-20.55
Stroke	0.34	0.15	0.12	0.65	0.49	0.011	0.009	0.06	0.05	0.87	0.67	-0.20	-23.35
Emotional disturbances	2.13	0.72	0.63	5.21	4.38	0.052	0.045	0.50	0.42	6.48	5.48	-1.01	-15.54
Total	16.92	6.07	4.90	40.03	28.54	0.52	0.41	3.91	2.86	50.53	36.71	-13.81	-27.34

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	7.20	21.10	24.05	25.62	1.57	6.54	29.80	34.96	5.16	17.33
Capital stock (US$ Billions)	85.03	239.46	448.01	464.42	16.41	3.64	1219.19	1337.56	118.38	9.72
Life expectancy at 65 (years)	14.79	17.04	18.63	19.71	1.08	5.78	21.31	23.36	2.05	9.62
GDP* by state (US$ Billions)	22.70	124.95	194.93	208.75	13.82	7.09	300.60	353.35	52.75	17.55

*Based on Real GDP

Louisiana

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	183	4,585	0.84	280	230	7,755	7,138	2.17	1.64	-50	-17.89	-617	-7.95	-0.53	-24.42
Breast cancer	18	4,553	0.08	26	22	7,784	7,159	0.20	0.16	-3	-12.30	-625	-8.03	-0.04	-19.34
Colon cancer	7	12,703	0.08	8	6	23,383	21,513	0.18	0.14	-1	-17.67	-1,870	-8.00	-0.04	-24.25
Lung cancer	6	17,917	0.11	8	6	30,691	28,228	0.24	0.18	-1	-18.44	-2,463	-8.03	-0.06	-24.99
Prostate cancer	20	3,676	0.07	33	26	6,404	5,891	0.21	0.15	-7	-21.48	-514	-8.02	-0.06	-27.78
Other cancers	132	3,712	0.49	206	169	6,517	5,995	1.34	1.01	-37	-18.00	-522	-8.02	-0.33	-24.58
Diabetes	239	1,947	0.46	328	284	3,398	3,125	1.11	0.89	-44	-13.30	-272	-8.02	-0.23	-20.25
Heart disease	332	3,573	1.18	454	297	6,537	6,014	2.97	1.79	-157	-34.63	-523	-8.00	-1.18	-39.86
Pulmonary conditions	704	919	0.65	865	744	1,648	1,516	1.43	1.13	-122	-14.05	-132	-8.01	-0.30	-20.94
Hypertension	644	950	0.61	823	669	1,660	1,527	1.37	1.02	-154	-18.70	-133	-8.02	-0.34	-25.21
Stroke	39	6,428	0.25	46	38	11,940	10,985	0.56	0.41	-9	-18.84	-954	-7.99	-0.14	-25.33
Mental disorders	445	1,259	0.56	620	543	2,183	2,008	1.35	1.09	-77	-12.35	-175	-8.02	-0.26	-19.38
Total	2,586	1,756	4.54	3,417	2,805	3,689	3,394	10.96	7.97	-612	-17.91	-295	-8.00	-2.99	-27.25

Direct Costs

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	4.69	0.80	0.65	13.50	8.01	0.058	0.047	1.31	0.85	15.66	9.56	-6.10	-38.94
Breast cancer	0.45	0.07	0.06	1.24	0.79	0.005	0.005	0.12	0.08	1.44	0.94	-0.50	-34.83
Colon cancer	0.46	0.07	0.06	1.14	0.68	0.005	0.004	0.11	0.07	1.32	0.81	-0.51	-38.80
Lung cancer	0.63	0.09	0.07	1.46	0.86	0.006	0.005	0.14	0.09	1.70	1.03	-0.67	-39.40
Prostate cancer	0.42	0.08	0.06	1.31	0.74	0.006	0.004	0.13	0.08	1.51	0.88	-0.63	-41.65
Other cancers	2.73	0.49	0.40	8.35	4.95	0.036	0.029	0.81	0.52	9.69	5.90	-3.78	-39.06
Diabetes	1.82	0.54	0.47	4.41	3.46	0.043	0.037	0.47	0.37	5.47	4.33	-1.14	-20.76
Heart disease	1.81	1.05	0.69	3.83	2.10	0.104	0.068	0.37	0.20	5.36	3.06	-2.31	-43.01
Asthma	1.34	0.71	0.61	2.54	2.07	0.052	0.045	0.25	0.20	3.55	2.92	-0.63	-17.74
Hypertension	4.90	1.99	1.61	10.32	8.16	0.195	0.159	1.00	0.79	13.50	10.72	-2.77	-20.55
Stroke	0.35	0.16	0.13	0.68	0.51	0.011	0.009	0.07	0.05	0.91	0.70	-0.21	-23.35
Emotional disturbances	2.51	0.83	0.73	6.07	5.10	0.061	0.053	0.58	0.49	7.55	6.37	-1.17	-15.54
Total	17.43	6.08	4.90	41.35	29.41	0.52	0.42	4.04	2.95	52.00	37.67	-14.33	-27.56

Indirect Impacts* (US$ Billions)

* Based on Nominal GDP

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	9.00	21.37	25.42	27.08	1.66	6.52	31.77	37.28	5.51	17.33
Capital stock (US$ Billions)	98.78	241.12	436.87	452.83	15.96	3.64	1169.07	1282.58	113.51	9.72
Life expectancy at 65 (years)	14.43	17.12	18.72	19.80	1.08	5.77	21.41	23.47	2.06	9.62
GDP* by state (US$ Billions)	30.02	139.92	227.25	243.33	16.08	7.07	355.54	417.92	62.38	17.55

Intergenerational Impacts

*Based on Real GDP

Maine

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	53	4,743	0.25	84	69	10,261	9,118	0.86	0.63	-15	-17.71	-1,143	-11.14	-0.23	-26.88
Breast cancer	6	5,391	0.03	10	8	11,597	10,296	0.11	0.09	-1	-12.30	-1,301	-11.21	-0.02	-22.13
Colon cancer	2	11,214	0.02	2	2	26,793	23,803	0.06	0.04	0	-17.67	-2,990	-11.16	-0.01	-26.86
Lung cancer	2	17,607	0.04	3	2	37,985	33,725	0.10	0.07	0	-18.44	-4,259	-11.21	-0.03	-27.59
Prostate cancer	5	4,766	0.02	9	7	10,531	9,351	0.09	0.06	-2	-21.48	-1,180	-11.20	-0.03	-30.27
Other cancers	38	3,716	0.14	61	50	8,303	7,373	0.51	0.37	-11	-18.00	-929	-11.19	-0.14	-27.18
Diabetes	69	2,003	0.14	119	104	4,439	3,941	0.53	0.41	-16	-13.30	-497	-11.20	-0.12	-23.01
Heart disease	83	2,826	0.23	127	83	6,694	5,946	0.85	0.49	-44	-34.63	-747	-11.16	-0.36	-41.92
Pulmonary conditions	274	840	0.23	356	306	1,933	1,717	0.69	0.53	-50	-14.05	-216	-11.18	-0.16	-23.66
Hypertension	175	864	0.15	238	193	1,917	1,703	0.46	0.33	-44	-18.70	-215	-11.20	-0.13	-27.80
Stroke	13	5,629	0.07	17	14	13,624	12,104	0.24	0.17	-3	-18.84	-1,519	-11.15	-0.07	-27.89
Mental disorders	177	1,664	0.29	256	224	3,652	3,243	0.93	0.73	-32	-12.35	-409	-11.20	-0.21	-22.17
Total	844	1,627	1.37	1,198	994	4,328	3,845	4.56	3.29	-204	-17.04	-484	-11.18	-1.27	-27.93

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	1.35	0.24	0.20	4.04	2.41	0.017	0.014	0.39	0.25	4.69	2.87	-1.82	-38.80
Breast cancer	0.18	0.03	0.03	0.53	0.33	0.002	0.002	0.05	0.04	0.61	0.40	-0.21	-34.83
Colon cancer	0.10	0.02	0.01	0.26	0.16	0.001	0.001	0.03	0.02	0.30	0.19	-0.12	-38.79
Lung cancer	0.19	0.03	0.02	0.45	0.26	0.002	0.002	0.04	0.03	0.52	0.32	-0.21	-39.40
Prostate cancer	0.13	0.03	0.02	0.43	0.24	0.002	0.001	0.04	0.03	0.50	0.29	-0.21	-41.65
Other cancers	0.75	0.14	0.11	2.38	1.41	0.010	0.008	0.23	0.15	2.76	1.68	-1.08	-39.06
Diabetes	0.53	0.20	0.17	1.61	1.26	0.016	0.014	0.17	0.13	1.99	1.58	-0.41	-20.76
Heart disease	0.45	0.29	0.19	1.07	0.59	0.029	0.019	0.10	0.06	1.50	0.85	-0.64	-43.01
Asthma	0.52	0.29	0.25	1.05	0.85	0.021	0.018	0.10	0.08	1.46	1.20	-0.26	-17.74
Hypertension	1.33	0.57	0.47	2.98	2.36	0.056	0.046	0.29	0.23	3.90	3.10	-0.80	-20.55
Stroke	0.12	0.06	0.05	0.26	0.19	0.004	0.003	0.02	0.02	0.34	0.26	-0.08	-23.35
Emotional disturbances	1.00	0.34	0.30	2.51	2.11	0.025	0.022	0.24	0.20	3.12	2.63	-0.48	-15.54
Total	5.30	2.00	1.63	13.51	9.76	0.17	0.14	1.32	0.98	17.01	12.50	-4.50	-26.48

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	8.40	23.23	26.93	28.68	1.75	6.49	33.44	39.24	5.80	17.34
Capital stock (US$ Billions)	25.95	75.73	146.14	151.45	5.31	3.64	380.73	417.71	36.98	9.72
Life expectancy at 65 (years)	14.66	18.24	19.95	21.10	1.15	5.74	22.81	25.01	2.20	9.63
GDP* by state (US$ Billions)	8.95	39.19	68.39	73.20	4.81	7.04	110.96	130.44	19.48	17.55

Maryland

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	227	4,519	1.03	381	313	8,232	7,475	3.14	2.34	-68	-17.87	-758	-9.20	-0.80	-25.43
Breast cancer	22	4,694	0.10	35	30	8,785	7,968	0.30	0.24	-4	-12.30	-817	-9.30	-0.06	-20.45
Colon cancer	7	11,876	0.08	9	7	24,226	21,982	0.21	0.16	-2	-17.67	-2,243	-9.26	-0.05	-25.29
Lung cancer	7	17,750	0.12	9	7	33,296	30,200	0.30	0.22	-2	-18.44	-3,096	-9.30	-0.08	-26.03
Prostate cancer	24	3,650	0.09	42	33	6,984	6,335	0.29	0.21	-9	-21.48	-649	-9.29	-0.08	-28.77
Other cancers	168	3,658	0.61	287	235	7,063	6,407	2.02	1.51	-52	-18.00	-656	-9.28	-0.52	-25.62
Diabetes	242	1,937	0.47	343	297	3,715	3,370	1.27	1.00	-46	-13.30	-345	-9.29	-0.27	-21.35
Heart disease	350	3,351	1.16	491	321	6,788	6,159	3.33	1.98	-170	-34.63	-629	-9.26	-1.36	-40.68
Pulmonary conditions	1,088	888	0.96	1,481	1,272	1,758	1,595	2.60	2.03	-208	-14.05	-163	-9.27	-0.57	-22.02
Hypertension	682	958	0.65	928	754	1,840	1,669	1.71	1.26	-173	-18.70	-171	-9.29	-0.45	-26.25
Stroke	42	5,893	0.25	53	43	12,148	11,024	0.64	0.47	-10	-18.84	-1,124	-9.26	-0.17	-26.36
Mental disorders	582	1,263	0.73	908	796	2,403	2,179	2.18	1.73	-112	-12.35	-223	-9.29	-0.45	-20.49
Total	3,212	1,626	5.22	4,584	3,797	3,782	3,432	14.88	10.81	-787	-17.17	-350	-9.27	-4.06	-27.31

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	5.83	1.08	0.89	18.34	10.89	0.078	0.064	1.77	1.15	21.28	12.99	-8.28	-38.93
Breast cancer	0.60	0.10	0.09	1.78	1.12	0.008	0.007	0.17	0.12	2.06	1.34	-0.72	-34.85
Colon cancer	0.46	0.07	0.06	1.24	0.74	0.005	0.004	0.12	0.08	1.44	0.88	-0.56	-38.81
Lung cancer	0.69	0.10	0.08	1.77	1.04	0.008	0.006	0.17	0.11	2.05	1.24	-0.81	-39.42
Prostate cancer	0.52	0.10	0.08	1.72	0.97	0.007	0.006	0.17	0.10	1.99	1.16	-0.83	-41.66
Other cancers	3.56	0.70	0.57	11.84	7.01	0.050	0.041	1.14	0.74	13.73	8.37	-5.37	-39.08
Diabetes	1.84	0.57	0.49	4.62	3.62	0.045	0.039	0.49	0.38	5.72	4.53	-1.19	-20.76
Heart disease	1.91	1.14	0.74	4.14	2.27	0.112	0.073	0.40	0.22	5.80	3.30	-2.49	-43.01
Asthma	2.07	1.22	1.05	4.35	3.53	0.089	0.076	0.42	0.34	6.08	5.00	-1.08	-17.74
Hypertension	5.18	2.24	1.82	11.63	9.20	0.220	0.179	1.13	0.89	15.22	12.09	-3.13	-20.55
Stroke	0.38	0.18	0.14	0.77	0.58	0.013	0.010	0.08	0.06	1.04	0.79	-0.24	-23.35
Emotional disturbances	3.28	1.22	1.07	8.89	7.48	0.089	0.078	0.85	0.72	11.06	9.34	-1.72	-15.54
Total	20.49	7.65	6.21	52.75	37.57	0.65	0.52	5.15	3.76	66.19	48.06	-18.13	-27.39

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	13.90	36.83	41.91	44.64	2.73	6.51	50.79	59.60	8.81	17.34
Capital stock (US$ Billions)	121.24	406.45	831.74	862.08	30.34	3.64	2649.89	2907.27	257.38	9.72
Life expectancy at 65 (years)	14.51	18.28	19.99	21.14	1.15	5.76	22.86	25.06	2.20	9.63
GDP* by state (US$ Billions)	40.43	211.88	345.13	369.51	24.38	7.06	637.09	748.92	111.83	17.55

*Based on Real GDP

Massachusetts

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	257	5,723	1.47	375	309	10,304	9,396	3.87	2.90	-66	-17.71	-909	-8.82	-0.97	-24.97
Breast cancer	33	6,258	0.20	44	38	11,354	10,347	0.50	0.40	-5	-12.30	-1,007	-8.87	-0.10	-20.07
Colon cancer	8	14,029	0.11	9	7	27,632	25,192	0.24	0.18	-2	-17.67	-2,441	-8.83	-0.06	-24.94
Lung cancer	9	21,366	0.19	11	9	38,856	35,411	0.42	0.32	-2	-18.44	-3,445	-8.87	-0.11	-25.68
Prostate cancer	25	5,720	0.14	40	31	10,599	9,660	0.42	0.30	-9	-21.48	-939	-8.86	-0.12	-28.43
Other cancers	182	4,483	0.82	272	223	8,380	7,638	2.28	1.70	-49	-18.00	-742	-8.85	-0.58	-25.26
Diabetes	285	2,322	0.66	396	343	4,312	3,930	1.71	1.35	-53	-13.30	-382	-8.86	-0.36	-20.98
Heart disease	391	3,510	1.37	487	319	6,867	6,261	3.35	1.99	-169	-34.63	-607	-8.83	-1.35	-40.40
Pulmonary conditions	1,342	1,003	1.34	1,624	1,395	1,919	1,749	3.12	2.44	-228	-14.05	-170	-8.84	-0.67	-21.65
Hypertension	762	978	0.75	956	777	1,818	1,657	1.74	1.29	-179	-18.70	-161	-8.86	-0.45	-25.90
Stroke	56	7,126	0.40	66	53	14,177	12,926	0.93	0.69	-12	-18.84	-1,252	-8.83	-0.24	-26.01
Mental disorders	1,089	1,928	2.09	1,509	1,322	3,553	3,238	5.36	4.28	-186	-12.35	-315	-8.86	-1.08	-20.11
Total	4,181	1,931	8.07	5,412	4,519	4,282	3,903	20.07	14.95	-893	-16.51	-379	-8.85	-5.12	-25.52

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	6.58	1.07	0.87	18.06	10.75	0.077	0.063	1.75	1.14	20.96	12.82	-8.13	-38.81
Breast cancer	0.92	0.14	0.12	2.32	1.47	0.010	0.009	0.22	0.16	2.70	1.76	-0.94	-34.82
Colon cancer	0.47	0.07	0.06	1.14	0.68	0.005	0.004	0.11	0.07	1.33	0.81	-0.51	-38.78
Lung cancer	0.87	0.12	0.09	1.98	1.17	0.008	0.007	0.19	0.12	2.30	1.39	-0.91	-39.38
Prostate cancer	0.65	0.12	0.09	1.98	1.12	0.008	0.007	0.19	0.12	2.30	1.34	-0.96	-41.63
Other cancers	3.67	0.63	0.51	10.64	6.30	0.045	0.037	1.03	0.67	12.34	7.52	-4.82	-39.05
Diabetes	2.18	0.65	0.57	5.33	4.18	0.052	0.045	0.57	0.44	6.61	5.24	-1.37	-20.76
Heart disease	2.14	1.13	0.74	4.11	2.25	0.111	0.073	0.40	0.22	5.75	3.28	-2.47	-43.01
Asthma	2.55	1.34	1.15	4.77	3.88	0.097	0.084	0.46	0.38	6.67	5.49	-1.18	-17.74
Hypertension	5.79	2.31	1.88	11.98	9.47	0.227	0.184	1.16	0.92	15.67	12.45	-3.22	-20.55
Stroke	0.51	0.22	0.18	0.96	0.73	0.016	0.013	0.09	0.07	1.29	0.99	-0.30	-23.35
Emotional disturbances	6.13	2.03	1.78	14.78	12.42	0.147	0.129	1.42	1.19	18.37	15.52	-2.85	-15.54
Total	25.88	8.75	7.17	60.00	43.67	0.73	0.59	5.85	4.35	75.32	55.78	-19.54	-25.94

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	12.60	34.80	42.24	44.99	2.75	6.52	51.01	59.88	8.87	17.38
Capital stock (US$ Billions)	205.24	590.77	1185.78	1229.06	43.28	3.64	3181.82	3491.66	309.84	9.72
Life expectancy at 65 (years)	15.08	18.82	20.58	21.77	1.19	5.76	23.53	25.80	2.27	9.65
GDP* by state (US$ Billions)	56.50	298.07	406.65	435.39	28.74	7.07	618.85	727.76	108.91	17.60

*Based on Real GDP

Michigan

Direct Costs																
	2003			2023												
				Projections - Level						Projections - Difference						
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	359	4,463	1.60	537	441	7,604	6,989	4.08	3.08	-96	-17.89	-615	-8.09	-1.00	-24.54
Breast cancer	38	4,427	0.17	52	45	7,608	6,992	0.39	0.32	-6	-12.30	-616	-8.10	-0.08	-19.40
Colon cancer	10	11,145	0.11	11	9	20,642	18,975	0.23	0.18	-2	-17.67	-1,666	-8.07	-0.06	-24.31
Lung cancer	11	15,109	0.17	13	11	26,021	23,913	0.34	0.26	-2	-18.44	-2,108	-8.10	-0.09	-25.05
Prostate cancer	42	4,171	0.18	67	53	7,307	6,716	0.49	0.36	-14	-21.48	-592	-8.10	-0.14	-27.84
Other cancers	258	3,774	0.97	394	323	6,664	6,125	2.62	1.98	-71	-18.00	-539	-8.09	-0.65	-24.64
Diabetes	465	2,022	0.94	638	553	3,549	3,262	2.26	1.80	-85	-13.30	-287	-8.09	-0.46	-20.32
Heart disease	742	3,710	2.75	965	631	6,830	6,278	6.59	3.96	-334	-34.63	-552	-8.08	-2.63	-39.90
Pulmonary conditions	2,119	1,055	2.24	2,593	2,229	1,903	1,749	4.94	3.90	-364	-14.05	-154	-8.08	-1.04	-21.00
Hypertension	1,391	799	1.11	1,769	1,439	1,404	1,291	2.48	1.86	-331	-18.70	-114	-8.09	-0.63	-25.28
Stroke	90	4,831	0.43	106	86	9,030	8,301	0.96	0.71	-20	-18.84	-729	-8.07	-0.24	-25.39
Mental disorders	998	1,501	1.49	1,375	1,206	2,616	2,405	3.60	2.90	-170	-12.35	-212	-8.10	-0.70	-19.45
Total	6,164	1,713	10.56	7,984	6,584	3,513	3,229	24.91	18.22	-1,400	-17.54	-284	-8.09	-6.70	-26.89

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	9.19	1.53	1.25	25.85	15.35	0.110	0.090	2.50	1.62	29.99	18.31	-11.68	-38.94
Breast cancer	0.97	0.15	0.13	2.49	1.58	0.011	0.009	0.24	0.17	2.89	1.88	-1.01	-34.79
Colon cancer	0.61	0.09	0.07	1.46	0.87	0.006	0.005	0.14	0.09	1.70	1.04	-0.66	-38.76
Lung cancer	0.96	0.13	0.10	2.18	1.28	0.009	0.008	0.21	0.14	2.53	1.53	-0.99	-39.36
Prostate cancer	1.02	0.18	0.14	3.12	1.77	0.013	0.010	0.30	0.19	3.61	2.11	-1.50	-41.61
Other cancers	5.63	0.98	0.80	16.60	9.84	0.071	0.058	1.61	1.04	19.26	11.74	-7.52	-39.02
Diabetes	3.55	1.05	0.91	8.59	6.74	0.084	0.072	0.92	0.71	10.64	8.43	-2.21	-20.76
Heart disease	4.06	2.24	1.46	8.14	4.45	0.220	0.144	0.79	0.43	11.39	6.49	-4.90	-43.01
Asthma	4.03	2.14	1.84	7.62	6.19	0.156	0.134	0.74	0.60	10.66	8.77	-1.89	-17.74
Hypertension	10.58	4.27	3.47	22.18	17.54	0.420	0.341	2.15	1.70	29.02	23.05	-5.96	-20.55
Stroke	0.82	0.36	0.29	1.55	1.17	0.026	0.021	0.15	0.11	2.08	1.60	-0.49	-23.35
Emotional disturbances	5.62	1.85	1.62	13.47	11.32	0.134	0.118	1.29	1.09	16.75	14.15	-2.60	-15.54
Total	37.85	13.44	10.85	87.40	62.76	1.15	0.92	8.54	6.27	110.53	80.80	-29.73	-26.90

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	9.40	23.27	26.56	28.30	1.74	6.54	33.13	38.90	5.77	17.40
Capital stock (US$ Billions)	258.65	691.59	1357.21	1406.96	49.76	3.64	3502.48	3843.95	341.47	9.72
Life expectancy at 65 (years)	14.71	18.23	19.93	21.08	1.15	5.79	22.79	24.99	2.20	9.66
GDP* by state (US$ Billions)	78.74	356.47	535.50	573.52	38.02	7.10	827.66	973.49	145.83	17.62

*Based on Real GDP

Minnesota

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
	Direct Costs														
Cancer	175	5,568	0.98	289	238	11,335	10,150	3.28	2.41	-52	-17.88	-1,185	-10.46	-0.87	-26.46
Breast cancer	20	5,870	0.12	30	26	11,991	10,731	0.36	0.28	-4	-12.30	-1,260	-10.51	-0.08	-21.52
Colon cancer	5	12,779	0.06	6	5	28,796	25,783	0.18	0.13	-1	-17.67	-3,013	-10.46	-0.05	-26.28
Lung cancer	5	19,152	0.09	6	5	39,232	35,109	0.24	0.18	-1	-18.44	-4,123	-10.51	-0.07	-27.02
Prostate cancer	21	5,259	0.11	38	30	11,018	9,861	0.42	0.29	-8	-21.48	-1,157	-10.50	-0.12	-29.72
Other cancers	125	4,708	0.59	209	172	9,967	8,921	2.09	1.53	-38	-18.00	-1,046	-10.49	-0.56	-26.61
Diabetes	163	2,324	0.38	254	220	4,881	4,368	1.24	0.96	-34	-13.30	-512	-10.50	-0.28	-22.40
Heart disease	232	4,212	0.98	327	214	9,415	8,430	3.08	1.80	-113	-34.63	-985	-10.47	-1.28	-41.47
Pulmonary conditions	778	1,197	0.93	1,059	910	2,606	2,333	2.76	2.12	-149	-14.05	-273	-10.48	-0.64	-23.06
Hypertension	579	912	0.53	807	656	1,920	1,718	1.55	1.13	-151	-18.70	-201	-10.50	-0.42	-27.23
Stroke	42	5,328	0.22	55	45	12,152	10,881	0.67	0.49	-10	-18.84	-1,271	-10.46	-0.18	-27.33
Mental disorders	750	1,767	1.32	1,153	1,011	3,677	3,291	4.24	3.33	-142	-12.35	-386	-10.50	-0.91	-21.55
Total	2,719	1,957	5.32	3,944	3,293	4,930	4,413	16.81	12.24	-651	-16.51	-517	-10.48	-4.58	-27.22

Chronic Disease	2003 Total Level	2023 Individual: Lost Work Days Baseline	Lost Work Days Optimistic	Presenteeism Baseline	Presenteeism Optimistic	2023 Caregiver: Lost Work Days Baseline	Lost Work Days Optimistic	Presenteeism Baseline	Presenteeism Optimistic	2023 Total: Projections - Level Baseline	Projections - Level Optimistic	Projections - Difference Absolute	Projections - Difference Percent
	Indirect Impacts* (US$ Billions)												
Cancer	4.49	0.82	0.67	13.93	8.28	0.059	0.049	1.35	0.88	16.17	9.87	-6.29	-38.93
Breast cancer	0.55	0.09	0.08	1.52	0.96	0.006	0.006	0.15	0.10	1.76	1.15	-0.61	-34.82
Colon cancer	0.28	0.04	0.04	0.75	0.45	0.003	0.003	0.07	0.05	0.87	0.53	-0.34	-38.78
Lung cancer	0.41	0.06	0.05	1.03	0.61	0.004	0.004	0.10	0.06	1.19	0.72	-0.47	-39.39
Prostate cancer	0.52	0.11	0.08	1.78	1.01	0.008	0.006	0.17	0.11	2.07	1.21	-0.86	-41.63
Other cancers	2.73	0.52	0.43	8.86	5.25	0.038	0.031	0.86	0.56	10.28	6.27	-4.01	-39.05
Diabetes	1.24	0.42	0.36	3.42	2.68	0.033	0.029	0.36	0.28	4.24	3.36	-0.88	-20.76
Heart disease	1.27	0.76	0.50	2.76	1.51	0.074	0.049	0.27	0.15	3.86	2.20	-1.66	-43.01
Asthma	1.48	0.87	0.75	3.11	2.53	0.063	0.055	0.30	0.25	4.35	3.58	-0.77	-17.74
Hypertension	4.40	1.95	1.58	10.12	8.00	0.191	0.156	0.98	0.78	13.24	10.52	-2.72	-20.55
Stroke	0.38	0.18	0.15	0.80	0.61	0.013	0.011	0.08	0.06	1.08	0.83	-0.25	-23.35
Emotional disturbances	4.22	1.55	1.36	11.30	9.49	0.113	0.099	1.08	0.91	14.04	11.86	-2.18	-15.54
Total	17.49	6.56	5.38	45.44	33.10	0.55	0.45	4.42	3.30	56.97	42.21	-14.76	-25.90

* Based on Nominal GDP

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
	Intergenerational Impacts									
Bachelor's degrees (percent)	11.10	31.53	36.77	39.16	2.39	6.49	44.63	52.38	7.75	17.36
Capital stock (US$ Billions)	139.43	361.22	739.58	766.49	26.91	3.64	2288.09	2510.66	222.57	9.72
Life expectancy at 65 (years)	15.73	19.53	21.36	22.59	1.23	5.75	24.42	26.77	2.35	9.64
GDP* by state (US$ Billions)	33.95	205.44	318.13	340.54	22.41	7.05	574.65	675.67	101.02	17.58

*Based on Real GDP

Mississippi

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	127	3,971	0.50	197	162	8,022	7,159	1.58	1.16	-35	-17.91	-863	-10.75	-0.42	-26.74
Breast cancer	13	3,835	0.05	18	16	8,020	7,151	0.14	0.11	-2	-12.30	-869	-10.83	-0.03	-21.80
Colon cancer	4	11,371	0.04	5	4	26,311	23,475	0.12	0.09	-1	-17.67	-2,836	-10.78	-0.03	-26.54
Lung cancer	3	15,482	0.05	4	3	32,466	28,951	0.13	0.10	-1	-18.44	-3,516	-10.83	-0.04	-27.28
Prostate cancer	15	3,171	0.05	24	19	6,804	6,068	0.16	0.11	-5	-21.48	-736	-10.82	-0.05	-29.97
Other cancers	92	3,214	0.30	146	120	6,973	6,219	1.02	0.75	-26	-18.00	-754	-10.81	-0.27	-26.87
Diabetes	199	1,736	0.34	289	250	3,735	3,331	1.08	0.83	-38	-13.30	-404	-10.82	-0.24	-22.67
Heart disease	250	3,209	0.80	341	223	7,362	6,569	2.51	1.47	-118	-34.63	-794	-10.78	-1.05	-41.67
Pulmonary conditions	503	823	0.41	632	543	1,837	1,639	1.16	0.89	-89	-14.05	-198	-10.80	-0.27	-23.33
Hypertension	476	847	0.40	634	515	1,825	1,627	1.16	0.84	-119	-18.70	-197	-10.81	-0.32	-27.49
Stroke	27	5,838	0.15	32	26	13,679	12,205	0.43	0.31	-6	-18.84	-1,473	-10.77	-0.12	-27.59
Mental disorders	240	1,114	0.27	334	293	2,374	2,117	0.79	0.62	-41	-12.35	-257	-10.82	-0.17	-21.83
Total	1,821	1,571	2.86	2,458	2,012	4,052	3,615	8.72	6.12	-446	-18.15	-437	-10.79	-2.60	-29.78

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	3.25	0.56	0.46	9.48	5.63	0.040	0.033	0.92	0.60	11.00	6.71	-4.28	-38.95
Breast cancer	0.33	0.05	0.04	0.87	0.55	0.004	0.003	0.08	0.06	1.01	0.66	-0.35	-34.84
Colon cancer	0.28	0.04	0.03	0.71	0.42	0.003	0.002	0.07	0.04	0.82	0.50	-0.32	-38.79
Lung cancer	0.35	0.05	0.04	0.80	0.47	0.003	0.003	0.08	0.05	0.93	0.56	-0.37	-39.40
Prostate cancer	0.31	0.06	0.05	0.98	0.56	0.004	0.003	0.10	0.06	1.14	0.67	-0.48	-41.65
Other cancers	1.97	0.36	0.29	6.12	3.62	0.026	0.021	0.59	0.38	7.09	4.32	-2.77	-39.06
Diabetes	1.51	0.48	0.41	3.89	3.05	0.038	0.033	0.41	0.32	4.82	3.82	-1.00	-20.76
Heart disease	1.36	0.79	0.52	2.88	1.57	0.078	0.051	0.28	0.15	4.03	2.29	-1.73	-43.01
Asthma	0.96	0.52	0.45	1.86	1.51	0.038	0.033	0.18	0.15	2.59	2.13	-0.46	-17.74
Hypertension	3.62	1.53	1.24	7.95	6.28	0.150	0.122	0.77	0.61	10.40	8.26	-2.14	-20.55
Stroke	0.24	0.11	0.09	0.46	0.35	0.008	0.006	0.05	0.03	0.62	0.48	-0.15	-23.35
Emotional disturbances	1.35	0.45	0.39	3.28	2.75	0.033	0.029	0.31	0.26	4.07	3.44	-0.63	-15.54
Total	12.30	4.44	3.56	29.79	21.15	0.38	0.31	2.92	2.12	37.53	27.14	-10.39	-27.69

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	8.10	21.17	22.18	23.63	1.45	6.52	28.13	33.01	4.88	17.33
Capital stock (US$ Billions)	55.03	110.93	210.08	217.75	7.68	3.64	563.46	618.17	54.71	9.72
Life expectancy at 65 (years)	14.63	17.12	18.72	19.80	1.08	5.77	21.41	23.47	2.06	9.62
GDP* by state (US$ Billions)	13.10	72.54	105.09	112.52	7.43	7.07	167.22	196.56	29.34	17.55

*Based on Real GDP

Missouri

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	186	5,334	0.99	285	235	10,325	9,324	2.95	2.19	-51	-17.75	-1,000	-9.69	-0.76	-25.71
Breast cancer	21	5,094	0.11	29	25	9,791	8,844	0.28	0.22	-4	-12.30	-947	-9.67	-0.06	-20.78
Colon cancer	5	13,848	0.08	7	5	29,120	26,316	0.19	0.14	-1	-17.67	-2,804	-9.63	-0.05	-25.60
Lung cancer	7	17,902	0.12	8	7	34,496	31,161	0.29	0.21	-2	-18.44	-3,336	-9.67	-0.08	-26.33
Prostate cancer	16	4,951	0.08	25	20	9,737	8,797	0.25	0.17	-5	-21.48	-941	-9.66	-0.07	-29.06
Other cancers	138	4,510	0.62	217	178	8,957	8,092	1.94	1.44	-39	-18.00	-865	-9.66	-0.50	-25.92
Diabetes	231	2,318	0.54	317	275	4,569	4,128	1.45	1.14	-42	-13.30	-441	-9.66	-0.31	-21.67
Heart disease	468	4,577	2.14	594	388	9,553	8,633	5.68	3.35	-206	-34.63	-920	-9.63	-2.32	-40.92
Pulmonary conditions	1,034	1,255	1.30	1,319	1,134	2,557	2,311	3.37	2.62	-185	-14.05	-247	-9.64	-0.75	-22.34
Hypertension	810	900	0.73	1,036	842	1,777	1,606	1.84	1.35	-194	-18.70	-172	-9.66	-0.49	-26.55
Stroke	59	6,062	0.35	68	55	12,889	11,648	0.88	0.64	-13	-18.84	-1,240	-9.62	-0.23	-26.65
Mental disorders	597	1,714	1.02	842	738	3,352	3,028	2.82	2.23	-104	-12.35	-324	-9.66	-0.59	-20.82
Total	3,385	2,092	7.08	4,461	3,667	4,809	4,345	18.98	13.52	-794	-17.81	-464	-9.65	-5.46	-28.75

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	4.78	0.81	0.66	13.73	8.17	0.059	0.048	1.33	0.86	15.93	9.74	-6.19	-38.83
Breast cancer	0.51	0.08	0.07	1.30	0.83	0.006	0.005	0.13	0.09	1.51	0.99	-0.53	-34.77
Colon cancer	0.36	0.05	0.04	0.89	0.53	0.004	0.003	0.09	0.06	1.03	0.63	-0.40	-38.73
Lung cancer	0.59	0.08	0.06	1.35	0.80	0.006	0.005	0.13	0.08	1.57	0.95	-0.62	-39.34
Prostate cancer	0.37	0.07	0.05	1.14	0.65	0.005	0.004	0.11	0.07	1.33	0.78	-0.55	-41.59
Other cancers	2.96	0.53	0.44	9.04	5.36	0.039	0.031	0.87	0.57	10.49	6.40	-4.09	-39.00
Diabetes	1.76	0.52	0.45	4.27	3.35	0.042	0.036	0.46	0.35	5.29	4.19	-1.10	-20.76
Heart disease	2.56	1.38	0.90	5.01	2.74	0.135	0.088	0.48	0.27	7.01	4.00	-3.02	-43.01
Asthma	1.97	1.09	0.94	3.88	3.15	0.079	0.068	0.38	0.31	5.42	4.46	-0.96	-17.74
Hypertension	6.16	2.50	2.03	12.99	10.27	0.246	0.200	1.26	1.00	16.99	13.50	-3.49	-20.55
Stroke	0.53	0.23	0.19	0.99	0.75	0.017	0.013	0.10	0.07	1.34	1.02	-0.31	-23.35
Emotional disturbances	3.36	1.13	0.99	8.24	6.93	0.082	0.072	0.79	0.66	10.25	8.66	-1.59	-15.54
Total	21.12	7.66	6.17	49.12	35.36	0.66	0.53	4.79	3.52	62.23	45.57	-16.66	-26.77

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	9.00	26.20	29.98	31.93	1.95	6.52	36.73	43.10	6.37	17.33
Capital stock (US$ Billions)	144.12	365.00	663.88	688.13	24.25	3.64	1872.71	2054.58	181.87	9.72
Life expectancy at 65 (years)	14.98	17.76	19.42	20.54	1.12	5.77	22.21	24.35	2.14	9.63
GDP* by state (US$ Billions)	39.87	193.33	299.46	320.64	21.18	7.07	485.90	571.18	85.28	17.55

*Based on Real GDP

Montana

	Direct Costs														
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	31	4,317	0.14	51	42	8,665	7,776	0.45	0.33	-9	-17.92	-889	-10.26	-0.12	-26.34
Breast cancer	3	4,479	0.01	5	4	9,016	8,087	0.04	0.03	-1	-12.30	-929	-10.31	-0.01	-21.34
Colon cancer	1	12,481	0.01	2	1	27,656	24,818	0.04	0.03	0	-17.67	-2,838	-10.26	-0.01	-26.12
Lung cancer	1	16,523	0.02	2	1	33,348	29,911	0.06	0.04	0	-18.44	-3,437	-10.31	-0.02	-26.85
Prostate cancer	3	3,875	0.01	6	5	7,994	7,171	0.05	0.03	-1	-21.48	-823	-10.30	-0.01	-29.56
Other cancers	23	3,275	0.08	38	31	6,827	6,124	0.26	0.19	-7	-18.00	-702	-10.29	-0.07	-26.44
Diabetes	31	1,964	0.06	57	50	4,061	3,643	0.23	0.18	-8	-13.30	-418	-10.29	-0.05	-22.22
Heart disease	54	3,699	0.20	89	58	8,131	7,296	0.73	0.43	-31	-34.63	-835	-10.26	-0.30	-41.34
Pulmonary conditions	129	907	0.12	169	145	1,943	1,743	0.33	0.25	-24	-14.05	-200	-10.28	-0.08	-22.89
Hypertension	86	865	0.07	122	99	1,793	1,608	0.22	0.16	-23	-18.70	-185	-10.29	-0.06	-27.06
Stroke	8	6,418	0.05	11	9	14,389	12,913	0.17	0.12	-2	-18.84	-1,476	-10.25	-0.04	-27.17
Mental disorders	141	1,725	0.25	215	189	3,536	3,172	0.76	0.60	-27	-12.35	-364	-10.30	-0.16	-21.38
Total	481	1,837	0.88	715	592	4,440	3,984	2.88	2.07	-123	-17.19	-456	-10.28	-0.81	-28.19

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	0.80	0.15	0.12	2.48	1.47	0.0106	0.0086	0.24	0.16	2.87	1.75	-1.12	-38.96
Breast cancer	0.07	0.01	0.01	0.23	0.14	0.0010	0.0008	0.02	0.02	0.26	0.17	-0.09	-34.82
Colon cancer	0.09	0.01	0.01	0.24	0.14	0.0010	0.0008	0.02	0.02	0.28	0.17	-0.11	-38.78
Lung cancer	0.13	0.02	0.02	0.31	0.19	0.0013	0.0011	0.03	0.02	0.36	0.22	-0.14	-39.39
Prostate cancer	0.07	0.02	0.01	0.27	0.15	0.0012	0.0009	0.03	0.02	0.32	0.18	-0.13	-41.63
Other cancers	0.45	0.08	0.07	1.42	0.84	0.0061	0.0049	0.14	0.09	1.65	1.01	-0.64	-39.05
Diabetes	0.24	0.09	0.08	0.77	0.60	0.0075	0.0065	0.08	0.06	0.95	0.76	-0.20	-20.76
Heart disease	0.29	0.21	0.14	0.75	0.41	0.0204	0.0133	0.07	0.04	1.05	0.60	-0.45	-43.01
Asthma	0.25	0.14	0.12	0.50	0.40	0.0101	0.0087	0.05	0.04	0.69	0.57	-0.12	-17.74
Hypertension	0.66	0.29	0.24	1.53	1.21	0.0289	0.0235	0.15	0.12	2.00	1.59	-0.41	-20.55
Stroke	0.07	0.04	0.03	0.17	0.13	0.0028	0.0022	0.02	0.01	0.23	0.17	-0.05	-23.35
Emotional disturbances	0.80	0.29	0.25	2.11	1.77	0.0210	0.0184	0.20	0.17	2.62	2.21	-0.41	-15.54
Total	3.10	1.21	0.98	8.30	5.99	0.10	0.08	0.81	0.60	10.42	7.65	-2.76	-26.53

* Based on Nominal GDP

	Intergenerational Impacts									
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	11.00	23.77	28.63	30.50	1.87	6.52	35.93	42.18	6.25	17.40
Capital stock (US$ Billions)	22.73	94.61	195.35	202.49	7.14	3.64	533.09	585.06	51.97	9.72
Life expectancy at 65 (years)	15.31	18.51	20.24	21.41	1.17	5.77	23.14	25.38	2.24	9.66
GDP* by state (US$ Billions)	4.43	24.91	46.05	49.31	3.26	7.07	77.44	91.09	13.65	17.62

*Based on Real GDP

Nebraska

Direct Costs

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	58	5,182	0.30	83	68	10,679	9,541	0.89	0.65	-15	-17.76	-1,137	-10.65	-0.23	-26.51
Breast cancer	7	5,025	0.03	9	8	10,375	9,270	0.09	0.07	-1	-12.30	-1,105	-10.65	-0.02	-21.64
Colon cancer	2	13,260	0.02	2	2	30,240	27,033	0.06	0.04	0	-17.67	-3,207	-10.60	-0.02	-26.40
Lung cancer	2	17,242	0.03	2	2	35,696	31,893	0.07	0.05	0	-18.44	-3,803	-10.65	-0.02	-27.13
Prostate cancer	6	4,814	0.03	9	7	10,196	9,111	0.09	0.06	-2	-21.48	-1,085	-10.64	-0.03	-29.84
Other cancers	42	4,382	0.19	61	50	9,378	8,381	0.57	0.42	-11	-18.00	-998	-10.64	-0.15	-26.73
Diabetes	65	2,212	0.14	88	76	4,696	4,197	0.41	0.32	-12	-13.30	-500	-10.64	-0.09	-22.52
Heart disease	113	4,374	0.49	137	90	9,894	8,844	1.36	0.79	-47	-34.63	-1,050	-10.61	-0.56	-41.56
Pulmonary conditions	279	1,202	0.34	329	283	2,648	2,367	0.87	0.67	-46	-14.05	-281	-10.62	-0.20	-23.18
Hypertension	210	862	0.18	254	206	1,834	1,639	0.47	0.34	-47	-18.70	-195	-10.64	-0.13	-27.35
Stroke	18	5,757	0.10	21	17	13,290	11,882	0.27	0.20	-4	-18.84	-1,409	-10.60	-0.07	-27.44
Mental disorders	208	1,640	0.34	279	245	3,451	3,084	0.96	0.75	-34	-12.35	-367	-10.65	-0.21	-21.68
Total	951	1,992	1.89	1,190	984	5,004	4,472	5.23	3.72	-206	-17.30	-532	-10.63	-1.50	-28.78

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	1.49	0.24	0.19	3.99	2.37	0.017	0.014	0.39	0.25	4.63	2.83	-1.80	-38.84
Breast cancer	0.17	0.03	0.02	0.42	0.27	0.002	0.002	0.04	0.03	0.49	0.32	-0.17	-34.78
Colon cancer	0.12	0.02	0.01	0.27	0.16	0.001	0.001	0.03	0.02	0.32	0.19	-0.12	-38.74
Lung cancer	0.14	0.02	0.01	0.31	0.18	0.001	0.001	0.03	0.02	0.35	0.21	-0.14	-39.35
Prostate cancer	0.14	0.02	0.02	0.41	0.23	0.002	0.001	0.04	0.02	0.47	0.28	-0.20	-41.60
Other cancers	0.93	0.15	0.12	2.58	1.53	0.011	0.009	0.25	0.16	3.00	1.83	-1.17	-39.02
Diabetes	0.50	0.14	0.13	1.18	0.92	0.012	0.010	0.13	0.10	1.46	1.16	-0.30	-20.76
Heart disease	0.62	0.32	0.21	1.16	0.63	0.031	0.020	0.11	0.06	1.62	0.92	-0.70	-43.01
Asthma	0.53	0.27	0.23	0.97	0.79	0.020	0.017	0.09	0.08	1.35	1.11	-0.24	-17.74
Hypertension	1.60	0.61	0.50	3.18	2.51	0.060	0.049	0.31	0.24	4.16	3.30	-0.85	-20.55
Stroke	0.16	0.07	0.06	0.30	0.23	0.005	0.004	0.03	0.02	0.40	0.31	-0.09	-23.35
Emotional disturbances	1.17	0.38	0.33	2.74	2.30	0.027	0.024	0.26	0.22	3.40	2.87	-0.53	-15.54
Total	6.07	2.03	1.64	13.51	9.76	0.17	0.14	1.32	0.97	17.02	12.51	-4.51	-26.52

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	9.60	26.53	30.30	32.28	1.98	6.54	37.25	43.72	6.47	17.38
Capital stock (US$ Billions)	42.98	120.44	219.15	227.19	8.04	3.64	574.11	630.01	55.90	9.72
Life expectancy at 65 (years)	15.86	18.66	20.40	21.58	1.18	5.79	23.33	25.58	2.25	9.65
GDP* by state (US$ Billions)	12.03	62.90	90.90	97.35	6.45	7.10	138.53	162.91	24.38	17.60

*Based on Real GDP

Nevada

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	80	4,001	0.32	178	146	10,571	9,156	1.88	1.34	-32	-17.85	-1,415	-13.39	-0.54	-28.85
Breast cancer	7	4,622	0.03	15	13	11,774	10,188	0.18	0.14	-2	-12.30	-1,586	-13.47	-0.04	-24.11
Colon cancer	3	10,101	0.03	6	5	29,231	25,317	0.17	0.12	-1	-17.67	-3,914	-13.39	-0.05	-28.69
Lung cancer	4	15,714	0.06	7	6	40,169	34,759	0.29	0.21	-1	-18.44	-5,410	-13.47	-0.09	-29.43
Prostate cancer	7	3,665	0.03	17	13	9,645	8,347	0.16	0.11	-4	-21.48	-1,297	-13.45	-0.05	-32.04
Other cancers	59	3,036	0.18	132	108	8,100	7,012	1.07	0.76	-24	-18.00	-1,089	-13.44	-0.31	-29.03
Diabetes	87	1,902	0.17	196	170	5,023	4,348	0.98	0.74	-26	-13.30	-676	-13.45	-0.25	-24.96
Heart disease	124	3,023	0.38	252	165	8,658	7,498	2.18	1.24	-87	-34.63	-1,160	-13.40	-0.95	-43.38
Pulmonary conditions	263	804	0.21	459	394	2,225	1,927	1.02	0.76	-64	-14.05	-299	-13.42	-0.26	-25.59
Hypertension	233	868	0.20	463	376	2,298	1,989	1.06	0.75	-87	-18.70	-309	-13.45	-0.32	-29.63
Stroke	14	4,942	0.07	25	20	14,527	12,583	0.36	0.26	-5	-18.84	-1,944	-13.38	-0.11	-29.70
Mental disorders	301	1,704	0.52	650	570	4,448	3,850	2.89	2.19	-80	-12.35	-598	-13.46	-0.70	-24.14
Total	1,103	1,697	1.87	2,222	1,841	5,347	4,629	10.38	7.27	-381	-17.15	-718	-13.43	-3.12	-30.01

Indirect Impacts* (US$ Billions)												
	2003	2023										
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	2.05	0.51	0.41	8.54	5.08	0.036	0.030	0.83	0.54	9.91	6.06	-3.86	-38.91
Breast cancer	0.20	0.05	0.04	0.82	0.52	0.004	0.003	0.08	0.06	0.96	0.62	-0.33	-34.84
Colon cancer	0.20	0.04	0.04	0.76	0.45	0.003	0.003	0.07	0.05	0.88	0.54	-0.34	-38.77
Lung cancer	0.38	0.08	0.06	1.34	0.79	0.006	0.005	0.13	0.08	1.56	0.94	-0.61	-39.41
Prostate cancer	0.17	0.04	0.03	0.75	0.43	0.003	0.002	0.07	0.05	0.87	0.51	-0.36	-41.65
Other cancers	1.11	0.29	0.23	4.87	2.89	0.021	0.017	0.47	0.31	5.65	3.44	-2.21	-39.06
Diabetes	0.66	0.32	0.28	2.64	2.07	0.026	0.022	0.28	0.22	3.27	2.59	-0.68	-20.76
Heart disease	0.68	0.59	0.38	2.13	1.16	0.057	0.038	0.21	0.11	2.98	1.70	-1.28	-43.01
Asthma	0.50	0.38	0.33	1.35	1.09	0.027	0.024	0.13	0.11	1.88	1.55	-0.33	-17.74
Hypertension	1.77	1.12	0.91	5.80	4.59	0.110	0.089	0.56	0.44	7.59	6.03	-1.56	-20.55
Stroke	0.13	0.08	0.07	0.37	0.28	0.006	0.005	0.04	0.03	0.49	0.38	-0.12	-23.35
Emotional disturbances	1.69	0.88	0.77	6.37	5.35	0.064	0.056	0.61	0.51	7.92	6.69	-1.23	-15.54
Total	7.49	3.87	3.14	27.20	19.62	0.33	0.26	2.65	1.96	34.05	24.99	-9.06	-26.60

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	10.80	21.37	24.49	26.08	1.59	6.50	31.09	36.49	5.40	17.38
Capital stock (US$ Billions)	21.81	220.43	739.50	766.43	26.93	3.64	3272.02	3590.59	318.57	9.72
Life expectancy at 65 (years)	14.36	17.62	19.27	20.38	1.11	5.75	22.03	24.16	2.13	9.65
GDP* by state (US$ Billions)	7.45	86.30	214.45	229.57	15.12	7.05	545.47	641.45	95.98	17.60

*Based on Real GDP

New Hampshire

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	50	4,293	0.22	88	73	8,586	7,715	0.76	0.56	-16	-17.67	-871	-10.15	-0.20	-26.03
Breast cancer	7	4,916	0.03	11	10	9,846	8,838	0.11	0.09	-1	-12.30	-1,008	-10.24	-0.02	-21.28
Colon cancer	1	10,039	0.01	2	2	22,117	19,863	0.04	0.03	0	-17.67	-2,254	-10.19	-0.01	-26.06
Lung cancer	2	16,000	0.03	2	2	32,127	28,838	0.08	0.06	0	-18.44	-3,289	-10.24	-0.02	-26.79
Prostate cancer	5	4,320	0.02	10	8	8,866	7,960	0.09	0.06	-2	-21.48	-907	-10.23	-0.03	-29.51
Other cancers	36	3,363	0.12	63	51	6,973	6,260	0.44	0.32	-11	-18.00	-713	-10.22	-0.12	-26.38
Diabetes	52	1,788	0.09	94	82	3,679	3,303	0.35	0.27	-13	-13.30	-376	-10.22	-0.08	-22.16
Heart disease	73	2,525	0.18	121	79	5,520	4,957	0.67	0.39	-42	-34.63	-563	-10.20	-0.27	-41.29
Pulmonary conditions	231	749	0.17	325	280	1,595	1,432	0.52	0.40	-46	-14.05	-163	-10.21	-0.12	-22.83
Hypertension	149	769	0.11	221	180	1,585	1,423	0.35	0.26	-41	-18.70	-162	-10.22	-0.09	-27.01
Stroke	9	5,015	0.04	13	11	11,178	10,039	0.15	0.11	-2	-18.84	-1,139	-10.19	-0.04	-27.11
Mental disorders	117	1,491	0.17	189	166	3,041	2,730	0.58	0.45	-23	-12.35	-311	-10.23	-0.12	-21.31
Total	681	1,465	1.00	1,052	869	3,714	3,335	3.36	2.44	-183	-17.37	-379	-10.20	-0.92	-27.50

Indirect Impacts* (US$ Billions)												
	2003	2023										
	Total	Individual				Caregiver				Total		
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	1.29	0.25	0.21	4.25	2.53	0.018	0.015	0.41	0.27	4.93	3.02	-1.91	-38.78
Breast cancer	0.19	0.04	0.03	0.62	0.39	0.003	0.002	0.06	0.04	0.72	0.47	-0.25	-34.85
Colon cancer	0.08	0.01	0.01	0.24	0.14	0.001	0.001	0.02	0.02	0.28	0.17	-0.11	-38.80
Lung cancer	0.17	0.03	0.02	0.44	0.26	0.002	0.002	0.04	0.03	0.51	0.31	-0.20	-39.41
Prostate cancer	0.13	0.03	0.02	0.50	0.28	0.002	0.002	0.05	0.03	0.57	0.34	-0.24	-41.66
Other cancers	0.72	0.14	0.12	2.45	1.45	0.010	0.009	0.24	0.15	2.84	1.73	-1.11	-39.07
Diabetes	0.39	0.16	0.13	1.27	1.00	0.012	0.011	0.14	0.11	1.57	1.25	-0.33	-20.76
Heart disease	0.40	0.28	0.18	1.02	0.56	0.027	0.018	0.10	0.05	1.42	0.81	-0.61	-43.01
Asthma	0.44	0.27	0.23	0.96	0.78	0.020	0.017	0.09	0.08	1.34	1.10	-0.24	-17.74
Hypertension	1.13	0.53	0.43	2.77	2.19	0.052	0.043	0.27	0.21	3.62	2.88	-0.74	-20.55
Stroke	0.08	0.04	0.04	0.19	0.15	0.003	0.003	0.02	0.01	0.26	0.20	-0.06	-23.35
Emotional disturbances	0.66	0.26	0.22	1.86	1.56	0.019	0.016	0.18	0.15	2.31	1.95	-0.36	-15.54
Total	4.40	1.79	1.45	12.31	8.75	0.15	0.12	1.20	0.88	15.45	11.20	-4.25	-27.51

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	10.90	31.90	38.12	40.61	2.49	6.52	46.04	54.04	8.00	17.38
Capital stock (US$ Billions)	22.79	108.17	218.30	226.28	7.98	3.64	692.34	759.76	67.42	9.72
Life expectancy at 65 (years)	14.73	18.94	20.71	21.90	1.19	5.77	23.68	25.97	2.29	9.65
GDP* by state (US$ Billions)	6.35	48.07	79.48	85.10	5.62	7.08	145.80	171.46	25.66	17.60

*Based on Real GDP

New Jersey

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	353	4,434	1.57	526	432	7,867	7,199	4.14	3.11	-94	-17.83	-669	-8.50	-1.03	-24.81
Breast cancer	42	5,242	0.22	58	51	9,330	8,528	0.54	0.43	-7	-12.30	-802	-8.60	-0.11	-19.84
Colon cancer	11	10,023	0.11	13	10	19,316	17,662	0.24	0.18	-2	-17.67	-1,654	-8.56	-0.06	-24.72
Lung cancer	12	16,670	0.19	14	12	29,738	27,182	0.42	0.32	-3	-18.44	-2,556	-8.60	-0.11	-25.46
Prostate cancer	42	4,491	0.19	67	53	8,159	7,458	0.55	0.40	-14	-21.48	-701	-8.59	-0.16	-28.22
Other cancers	247	3,474	0.86	374	307	6,364	5,818	2.38	1.78	-67	-18.00	-546	-8.59	-0.60	-25.04
Diabetes	440	1,980	0.87	623	541	3,604	3,295	2.25	1.78	-83	-13.30	-310	-8.59	-0.47	-20.74
Heart disease	589	2,552	1.50	763	499	4,886	4,468	3.73	2.23	-264	-34.63	-419	-8.57	-1.50	-40.23
Pulmonary conditions	1,295	793	1.02	1,582	1,360	1,487	1,360	2.35	1.85	-222	-14.05	-128	-8.58	-0.50	-21.42
Hypertension	1,137	870	0.99	1,494	1,214	1,586	1,450	2.37	1.76	-279	-18.70	-136	-8.59	-0.61	-25.68
Stroke	65	4,977	0.32	75	61	9,686	8,857	0.73	0.54	-14	-18.84	-829	-8.56	-0.19	-25.79
Mental disorders	742	1,650	1.22	1,055	925	2,981	2,725	3.14	2.52	-130	-12.35	-256	-8.59	-0.63	-19.88
Total	4,620	1,622	7.49	6,118	5,031	3,605	3,296	18.71	13.79	-1,087	-17.76	-309	-8.57	-4.92	-26.29

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	9.05	1.50	1.22	25.33	15.05	0.108	0.088	2.45	1.59	29.38	17.96	-11.43	-38.89
Breast cancer	1.27	0.20	0.17	3.30	2.09	0.014	0.012	0.32	0.22	3.83	2.50	-1.34	-34.85
Colon cancer	0.61	0.09	0.07	1.50	0.89	0.006	0.005	0.14	0.09	1.74	1.06	-0.67	-38.82
Lung cancer	1.11	0.15	0.12	2.60	1.53	0.011	0.009	0.25	0.16	3.02	1.83	-1.19	-39.42
Prostate cancer	1.09	0.20	0.16	3.37	1.91	0.014	0.011	0.33	0.20	3.91	2.28	-1.63	-41.66
Other cancers	4.96	0.86	0.70	14.56	8.62	0.062	0.051	1.41	0.91	16.89	10.29	-6.60	-39.08
Diabetes	3.35	1.03	0.89	8.39	6.58	0.082	0.071	0.90	0.70	10.40	8.24	-2.16	-20.76
Heart disease	3.22	1.77	1.16	6.44	3.52	0.174	0.114	0.62	0.34	9.01	5.13	-3.87	-43.01
Asthma	2.47	1.31	1.12	4.65	3.78	0.095	0.082	0.45	0.37	6.50	5.35	-1.15	-17.74
Hypertension	8.65	3.61	2.93	18.72	14.81	0.354	0.288	1.82	1.44	24.50	19.46	-5.04	-20.55
Stroke	0.59	0.25	0.21	1.10	0.83	0.018	0.015	0.11	0.08	1.48	1.13	-0.35	-23.35
Emotional disturbances	4.18	1.42	1.24	10.33	8.68	0.103	0.090	0.99	0.83	12.85	10.85	-2.00	-15.54
Total	31.50	10.88	8.78	74.96	53.25	0.93	0.75	7.33	5.35	94.11	68.12	-25.99	-27.62

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	11.80	31.83	37.69	40.14	2.45	6.50	45.89	53.86	7.97	17.36
Capital stock (US$ Billions)	227.37	758.53	1420.60	1472.35	51.75	3.64	4043.82	4437.12	393.30	9.72
Life expectancy at 65 (years)	14.62	18.69	20.44	21.62	1.18	5.75	23.37	25.62	2.25	9.64
GDP* by state (US$ Billions)	78.61	375.85	571.63	611.95	40.32	7.05	951.73	1119.01	167.28	17.58

*Based on Real GDP

New Mexico

Direct Costs																
	2003			2023												
				Projections - Level						Projections - Difference						
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)		
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent	
Cancer	56	3,277	0.18	91	75	6,187	5,599	0.57	0.42	-16	-17.75	-588	-9.51	-0.14	-25.57	
Breast cancer	5	3,350	0.02	10	9	6,387	5,777	0.06	0.05	-1	-12.30	-610	-9.56	-0.01	-20.68	
Colon cancer	2	9,547	0.02	3	2	19,891	17,998	0.06	0.04	0	-17.67	-1,893	-9.52	-0.01	-25.50	
Lung cancer	2	12,996	0.03	3	2	24,838	22,464	0.07	0.05	0	-18.44	-2,374	-9.56	-0.02	-26.24	
Prostate cancer	5	2,950	0.02	10	8	5,753	5,204	0.06	0.04	-2	-21.48	-549	-9.55	-0.02	-28.97	
Other cancers	41	2,487	0.10	66	54	4,896	4,429	0.32	0.24	-12	-18.00	-467	-9.54	-0.08	-25.83	
Diabetes	66	1,561	0.10	120	104	3,051	2,760	0.37	0.29	-16	-13.30	-291	-9.55	-0.08	-21.57	
Heart disease	92	2,845	0.26	171	112	5,885	5,324	1.01	0.60	-59	-34.63	-560	-9.52	-0.41	-40.85	
Pulmonary conditions	224	700	0.16	270	232	1,414	1,279	0.38	0.30	-38	-14.05	-135	-9.53	-0.09	-22.25	
Hypertension	175	682	0.12	259	211	1,336	1,208	0.35	0.25	-48	-18.70	-127	-9.55	-0.09	-26.46	
Stroke	11	4,972	0.05	16	13	10,472	9,476	0.17	0.13	-3	-18.84	-996	-9.51	-0.05	-26.56	
Mental disorders	264	1,371	0.37	410	359	2,659	2,405	1.09	0.86	-51	-12.35	-254	-9.55	-0.23	-20.72	
Total	887	1,396	1.24	1,338	1,107	3,162	2,861	3.93	2.85	-232	-17.31	-301	-9.53	-1.08	-27.57	

Indirect Impacts* (US$ Billions)												
	2003	2023										
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	1.43	0.26	0.21	4.40	2.62	0.019	0.015	0.425	0.277	5.10	3.12	-1.98	-38.84
Breast cancer	0.14	0.03	0.03	0.50	0.31	0.002	0.002	0.048	0.033	0.58	0.38	-0.20	-34.81
Colon cancer	0.15	0.03	0.02	0.43	0.26	0.002	0.002	0.042	0.027	0.50	0.31	-0.20	-38.78
Lung cancer	0.20	0.03	0.02	0.51	0.30	0.002	0.002	0.049	0.032	0.59	0.36	-0.23	-39.38
Prostate cancer	0.12	0.03	0.02	0.43	0.25	0.002	0.001	0.042	0.026	0.50	0.29	-0.21	-41.63
Other cancers	0.82	0.15	0.12	2.52	1.50	0.011	0.009	0.244	0.158	2.93	1.78	-1.14	-39.05
Diabetes	0.50	0.20	0.17	1.61	1.26	0.016	0.014	0.172	0.134	2.00	1.58	-0.41	-20.76
Heart disease	0.50	0.40	0.26	1.45	0.79	0.039	0.026	0.140	0.076	2.02	1.15	-0.87	-43.01
Asthma	0.43	0.22	0.19	0.79	0.65	0.016	0.014	0.077	0.063	1.11	0.91	-0.20	-17.74
Hypertension	1.33	0.63	0.51	3.25	2.57	0.061	0.050	0.315	0.249	4.25	3.38	-0.87	-20.55
Stroke	0.10	0.05	0.04	0.24	0.18	0.004	0.003	0.023	0.018	0.32	0.25	-0.07	-23.35
Emotional disturbances	1.49	0.55	0.48	4.02	3.38	0.040	0.035	0.385	0.324	4.99	4.22	-0.78	-15.54
Total	5.78	2.31	1.87	15.76	11.44	0.20	0.16	1.54	1.14	19.80	14.61	-5.19	-26.20

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	12.70	23.70	27.58	29.38	1.80	6.51	35.12	41.21	6.09	17.34
Capital stock (US$ Billions)	31.78	172.50	341.49	353.94	12.46	3.64	889.35	975.74	86.40	9.72
Life expectancy at 65 (years)	15.46	18.92	20.69	21.88	1.19	5.76	23.66	25.94	2.28	9.63
GDP* by state (US$ Billions)	6.90	56.92	88.79	95.06	6.27	7.06	148.54	174.62	26.08	17.56

*Based on Real GDP

New York

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	714	5,034	3.59	982	808	9,048	8,257	8.89	6.67	-174	-17.72	-790	-8.74	-2.21	-24.91
Breast cancer	90	5,554	0.50	115	101	10,023	9,142	1.15	0.92	-14	-12.30	-881	-8.79	-0.23	-20.01
Colon cancer	22	12,247	0.27	24	20	23,972	21,873	0.58	0.44	-4	-17.67	-2,099	-8.76	-0.14	-24.88
Lung cancer	25	18,993	0.47	28	23	34,351	31,332	0.97	0.72	-5	-18.44	-3,019	-8.79	-0.25	-25.61
Prostate cancer	72	5,047	0.36	108	85	9,300	8,483	1.01	0.72	-23	-21.48	-817	-8.78	-0.29	-28.37
Other cancers	506	3,944	2.00	707	580	7,329	6,686	5.18	3.87	-127	-18.00	-643	-8.78	-1.31	-25.20
Diabetes	1,020	2,175	2.22	1,299	1,126	4,016	3,663	5.22	4.12	-173	-13.30	-353	-8.78	-1.09	-20.91
Heart disease	1,477	3,093	4.57	1,767	1,155	6,013	5,487	10.63	6.34	-612	-34.63	-527	-8.76	-4.29	-40.35
Pulmonary conditions	3,086	910	2.80	3,482	2,993	1,730	1,579	6.03	4.72	-489	-14.05	-152	-8.77	-1.30	-21.59
Hypertension	2,501	929	2.32	2,978	2,422	1,717	1,566	5.11	3.79	-557	-18.70	-151	-8.78	-1.32	-25.83
Stroke	119	6,246	0.74	127	103	12,348	11,267	1.57	1.16	-24	-18.84	-1,081	-8.75	-0.41	-25.95
Mental disorders	1,572	1,800	2.81	2,062	1,808	3,299	3,009	6.80	5.44	-255	-12.35	-290	-8.78	-1.36	-20.05
Total	10,488	1,817	19.06	12,697	10,414	4,039	3,685	44.23	32.25	-2,283	-17.98	-354	-8.77	-11.98	-27.09

Direct Costs

Chronic Disease	2003 Total Level	2023 Individual: Lost Work Days Baseline	Lost Work Days Optimistic	Presenteeism Baseline	Presenteeism Optimistic	2023 Caregiver: Lost Work Days Baseline	Lost Work Days Optimistic	Presenteeism Baseline	Presenteeism Optimistic	2023 Total: Projections - Level Baseline	Projections - Level Optimistic	Projections - Difference Absolute	Projections - Difference Percent
Cancer	18.29	2.80	2.29	47.28	28.13	0.202	0.165	4.57	2.98	54.85	33.56	-21.29	-38.82
Breast cancer	2.53	0.36	0.32	6.11	3.87	0.026	0.023	0.59	0.41	7.09	4.62	-2.47	-34.82
Colon cancer	1.36	0.18	0.15	3.10	1.85	0.013	0.011	0.30	0.20	3.60	2.20	-1.40	-38.79
Lung cancer	2.39	0.30	0.25	5.15	3.04	0.022	0.018	0.50	0.32	5.98	3.62	-2.35	-39.39
Prostate cancer	1.85	0.32	0.25	5.35	3.04	0.023	0.018	0.52	0.32	6.20	3.62	-2.58	-41.64
Other cancers	10.16	1.63	1.33	27.56	16.34	0.118	0.096	2.67	1.73	31.98	19.49	-12.49	-39.05
Diabetes	7.78	2.14	1.86	17.48	13.71	0.171	0.147	1.86	1.45	21.66	17.16	-4.50	-20.76
Heart disease	8.07	4.10	2.68	14.91	8.15	0.403	0.263	1.44	0.79	20.86	11.89	-8.97	-43.01
Asthma	5.87	2.87	2.47	10.23	8.31	0.209	0.180	0.99	0.81	14.31	11.77	-2.54	-17.74
Hypertension	19.02	7.19	5.84	37.33	29.53	0.706	0.575	3.62	2.86	48.85	38.81	-10.04	-20.55
Stroke	1.08	0.42	0.35	1.85	1.40	0.031	0.025	0.18	0.14	2.49	1.91	-0.58	-23.35
Emotional disturbances	8.85	2.78	2.43	20.20	16.98	0.202	0.176	1.94	1.63	25.12	21.22	-3.90	-15.54
Total	68.97	22.30	17.92	149.29	106.21	1.92	1.53	14.61	10.65	188.12	136.31	-51.82	-27.54

Indirect Impacts* (US$ Billions)

* Based on Nominal GDP

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	11.90	29.10	33.67	35.86	2.19	6.49	41.52	48.72	7.20	17.34
Capital stock (US$ Billions)	693.91	1306.33	2359.49	2445.28	85.78	3.64	6020.26	6605.14	584.89	9.72
Life expectancy at 65 (years)	14.68	19.20	21.00	22.21	1.21	5.74	24.01	26.32	2.31	9.63
GDP* by state (US$ Billions)	203.35	833.52	1093.76	1172.99	79.23	7.24	1650.46	1945.55	295.09	17.88

Intergenerational Impacts

*Based on Real GDP

North Carolina

Direct Costs	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	297	4,219	1.25	532	437	9,419	8,327	5.01	3.64	-95	-17.83	-1,092	-11.60	-1.37	-27.36
Breast cancer	32	4,230	0.14	51	45	9,407	8,310	0.48	0.37	-6	-12.30	-1,097	-11.66	-0.11	-22.53
Colon cancer	10	11,593	0.11	14	11	28,763	25,425	0.39	0.29	-2	-17.67	-3,338	-11.60	-0.11	-27.22
Lung cancer	11	16,601	0.17	16	13	37,028	32,710	0.57	0.41	-3	-18.44	-4,318	-11.66	-0.16	-27.96
Prostate cancer	30	3,392	0.10	57	45	7,757	6,853	0.44	0.31	-12	-21.48	-904	-11.65	-0.14	-30.63
Other cancers	215	3,415	0.73	395	324	7,902	6,982	3.12	2.26	-71	-18.00	-920	-11.64	-0.86	-27.55
Diabetes	427	1,887	0.80	680	589	4,328	3,824	2.94	2.25	-90	-13.30	-504	-11.65	-0.69	-23.40
Heart disease	537	3,288	1.75	774	506	8,083	7,145	6.26	3.62	-268	-34.63	-938	-11.61	-2.64	-42.21
Pulmonary conditions	1,513	868	1.31	2,231	1,917	2,072	1,831	4.62	3.51	-313	-14.05	-241	-11.62	-1.11	-24.04
Hypertension	1,192	932	1.11	1,780	1,447	2,141	1,891	3.81	2.74	-333	-18.70	-249	-11.65	-1.07	-28.16
Stroke	80	5,881	0.47	107	87	14,788	13,073	1.58	1.14	-20	-18.84	-1,715	-11.60	-0.45	-28.25
Mental disorders	993	1,217	1.20	1,682	1,475	2,764	2,442	4.65	3.60	-208	-12.35	-322	-11.65	-1.05	-22.56
Total	5,038	1,567	7.90	7,786	6,459	4,265	3,770	28.88	20.50	-1,328	-17.05	-496	-11.63	-8.38	-29.03

Indirect Impacts* (US$ Billions)	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	7.60	1.51	1.24	25.61	15.22	0.109	0.089	2.48	1.61	29.71	18.15	-11.56	-38.90
Breast cancer	0.83	0.14	0.13	2.44	1.55	0.010	0.009	0.24	0.16	2.84	1.85	-0.99	-34.83
Colon cancer	0.68	0.12	0.10	2.02	1.20	0.009	0.007	0.20	0.13	2.34	1.43	-0.91	-38.78
Lung cancer	1.06	0.17	0.14	2.94	1.73	0.013	0.010	0.28	0.18	3.41	2.07	-1.34	-39.40
Prostate cancer	0.61	0.13	0.10	2.25	1.28	0.010	0.007	0.22	0.14	2.61	1.53	-1.09	-41.64
Other cancers	4.43	0.94	0.77	15.95	9.46	0.068	0.055	1.54	1.00	18.51	11.28	-7.23	-39.06
Diabetes	3.26	1.12	0.97	9.15	7.17	0.090	0.077	0.98	0.76	11.33	8.98	-2.35	-20.76
Heart disease	2.93	1.80	1.17	6.53	3.57	0.177	0.115	0.63	0.35	9.14	5.21	-3.93	-43.01
Asthma	2.88	1.84	1.58	6.55	5.33	0.134	0.115	0.64	0.52	9.17	7.54	-1.63	-17.74
Hypertension	9.06	4.30	3.49	22.31	17.65	0.422	0.344	2.16	1.71	29.20	23.20	-6.00	-20.55
Stroke	0.73	0.36	0.29	1.57	1.18	0.026	0.021	0.15	0.12	2.10	1.61	-0.49	-23.35
Emotional disturbances	5.60	2.26	1.99	16.48	13.85	0.164	0.144	1.58	1.33	20.49	17.31	-3.18	-15.54
Total	32.06	13.19	10.74	88.21	63.97	1.12	0.90	8.62	6.39	111.14	82.00	-29.14	-26.22

* Based on Nominal GDP

Intergenerational Impacts			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	8.50	23.10	26.97	28.73	1.76	6.52	33.39	39.18	5.79	17.33
Capital stock (US$ Billions)	147.44	420.59	1004.93	1041.64	36.71	3.64	3563.14	3909.18	346.04	9.72
Life expectancy at 65 (years)	14.81	17.76	19.42	20.54	1.12	5.77	22.21	24.35	2.14	9.63
GDP* by state (US$ Billions)	45.42	309.26	492.27	527.09	34.82	7.07	967.36	1137.13	169.77	17.55

*Based on Real GDP

North Dakota

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	Optimistic	Expenditure per PRC ($) Baseline	Optimistic	Total Expenditure (US$ Billions) Baseline	Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	Percent	Expenditure per PRC ($) Absolute	Percent	Avoidable Costs (US$ Billions) Absolute	Percent
Direct Costs															
Cancer	20	5,766	0.12	29	24	10,143	9,269	0.29	0.22	-5	-17.93	-874	-8.62	-0.07	-25.00
Breast cancer	2	5,410	0.01	3	3	9,641	8,810	0.03	0.02	0	-12.30	-831	-8.61	-0.01	-19.85
Colon cancer	1	15,292	0.01	1	1	29,512	26,979	0.02	0.01	0	-17.67	-2,533	-8.58	0.00	-24.73
Lung cancer	1	18,995	0.01	1	1	33,927	31,004	0.02	0.02	0	-18.44	-2,922	-8.61	-0.01	-25.47
Prostate cancer	3	5,325	0.01	4	3	9,685	8,851	0.04	0.03	-1	-21.48	-833	-8.61	-0.01	-28.24
Other cancers	15	4,876	0.07	21	17	8,943	8,174	0.19	0.14	-4	-18.00	-769	-8.60	-0.05	-25.06
Diabetes	23	2,444	0.06	34	30	4,456	4,072	0.15	0.12	-5	-13.30	-383	-8.61	-0.03	-20.76
Heart disease	47	5,036	0.23	59	39	9,654	8,826	0.57	0.34	-21	-34.63	-829	-8.58	-0.23	-40.24
Pulmonary conditions	100	1,360	0.14	118	102	2,553	2,333	0.30	0.24	-17	-14.05	-219	-8.59	-0.06	-21.44
Hypertension	78	946	0.07	94	76	1,726	1,578	0.16	0.12	-18	-18.70	-149	-8.60	-0.04	-25.69
Stroke	8	6,715	0.05	9	8	13,086	11,963	0.12	0.09	-2	-18.84	-1,122	-8.58	-0.03	-25.80
Mental disorders	42	1,800	0.08	54	48	3,257	2,977	0.18	0.14	-7	-12.35	-280	-8.61	-0.04	-19.89
Total	318	2,341	0.75	399	326	5,035	4,602	1.78	1.28	-73	-18.31	-433	-8.60	-0.51	-28.54

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Optimistic	Individual Presenteeism Baseline	Optimistic	Caregiver Lost Work Days Baseline	Optimistic	Caregiver Presenteeism Baseline	Optimistic	Total Projections - Level Baseline	Optimistic	Total Projections - Difference Absolute	Percent
Cancer	0.53	0.08	0.07	1.40	0.83	0.0060	0.0049	0.135	0.088	1.62	0.99	-0.63	-38.97
Breast cancer	0.05	0.01	0.01	0.13	0.08	0.0006	0.0005	0.013	0.009	0.15	0.10	-0.05	-34.78
Colon cancer	0.04	0.01	0.00	0.09	0.06	0.0004	0.0003	0.009	0.006	0.11	0.07	-0.04	-38.75
Lung cancer	0.05	0.01	0.00	0.10	0.06	0.0004	0.0004	0.010	0.006	0.12	0.07	-0.05	-39.35
Prostate cancer	0.06	0.01	0.01	0.19	0.11	0.0008	0.0006	0.018	0.011	0.22	0.13	-0.09	-41.60
Other cancers	0.32	0.05	0.04	0.88	0.52	0.0038	0.0031	0.085	0.055	1.02	0.62	-0.40	-39.01
Diabetes	0.18	0.06	0.05	0.46	0.36	0.0045	0.0039	0.049	0.038	0.57	0.46	-0.12	-20.76
Heart disease	0.25	0.14	0.09	0.50	0.27	0.0135	0.0088	0.048	0.027	0.70	0.40	-0.30	-43.01
Asthma	0.19	0.10	0.08	0.35	0.28	0.0071	0.0061	0.034	0.027	0.49	0.40	-0.09	-17.74
Hypertension	0.60	0.23	0.18	1.18	0.93	0.0223	0.0181	0.114	0.090	1.54	1.23	-0.32	-20.55
Stroke	0.07	0.03	0.03	0.14	0.10	0.0023	0.0018	0.013	0.010	0.18	0.14	-0.04	-23.35
Emotional disturbances	0.24	0.07	0.06	0.53	0.45	0.0053	0.0047	0.051	0.043	0.66	0.56	-0.10	-15.54
Total	2.05	0.71	0.56	4.56	3.23	0.06	0.05	0.45	0.32	5.77	4.17	-1.60	-27.75

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	Optimistic	2023 Projections - Difference Absolute	Percent	2050 Projections - Level Baseline	Optimistic	2050 Projections - Difference Absolute	Percent
Bachelor's degrees (percent)	8.40	24.97	28.52	30.39	1.87	6.54	35.19	41.29	6.10	17.34
Capital stock (US$ Billions)	14.76	62.81	81.24	84.22	2.98	3.64	184.56	202.49	17.93	9.72
Life expectancy at 65 (years)	15.77	19.08	20.86	22.07	1.21	5.78	23.86	26.16	2.30	9.63
GDP* by state (US$ Billions)	3.65	21.01	29.64	31.74	2.10	7.09	40.59	47.72	7.13	17.56

*Based on Real GDP

Ohio

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC	Expenditure per PRC	Total Expenditure	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease	(Thousands)	($)	(US$ Billions)	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	377	5,125	1.93	542	445	9,208	8,407	4.99	3.74	-97	-17.82	-801	-8.70	-1.25	-24.96
Breast cancer	41	5,140	0.21	53	46	9,224	8,421	0.49	0.39	-7	-12.30	-804	-8.71	-0.10	-19.94
Colon cancer	11	12,592	0.14	12	10	24,492	22,367	0.30	0.22	-2	-17.67	-2,125	-8.68	-0.07	-24.81
Lung cancer	13	17,415	0.22	15	12	31,321	28,593	0.46	0.34	-3	-18.44	-2,728	-8.71	-0.12	-25.55
Prostate cancer	37	4,799	0.18	57	45	8,791	8,026	0.50	0.36	-12	-21.48	-765	-8.70	-0.14	-28.31
Other cancers	275	4,334	1.19	405	332	8,007	7,311	3.24	2.43	-73	-18.00	-697	-8.70	-0.82	-25.14
Diabetes	595	2,253	1.34	764	663	4,136	3,776	3.16	2.50	-102	-13.30	-360	-8.70	-0.66	-20.84
Heart disease	875	4,175	3.65	1,054	689	8,067	7,367	8.50	5.08	-365	-34.63	-700	-8.68	-3.43	-40.30
Pulmonary conditions	1,835	1,179	2.17	2,194	1,886	2,229	2,035	4.89	3.84	-308	-14.05	-194	-8.69	-1.05	-21.52
Hypertension	1,549	886	1.37	1,849	1,503	1,629	1,487	3.01	2.24	-346	-18.70	-142	-8.70	-0.78	-25.77
Stroke	113	5,414	0.61	126	102	10,634	9,712	1.33	0.99	-24	-18.84	-922	-8.67	-0.35	-25.88
Mental disorders	1,432	1,683	2.39	1,878	1,646	3,066	2,799	5.76	4.61	-232	-12.35	-267	-8.71	-1.15	-19.98
Total	6,775	1,990	13.48	8,406	6,934	4,247	3,878	31.65	22.99	-1,473	-17.52	-369	-8.69	-8.66	-27.35

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	9.66	1.54	1.26	26.08	15.50	0.111	0.091	2.52	1.64	30.25	18.49	-11.76	-38.88
Breast cancer	1.06	0.15	0.13	2.55	1.62	0.011	0.009	0.25	0.17	2.96	1.93	-1.03	-34.79
Colon cancer	0.68	0.09	0.08	1.56	0.93	0.007	0.005	0.15	0.10	1.81	1.11	-0.70	-38.76
Lung cancer	1.11	0.14	0.11	2.40	1.41	0.010	0.008	0.23	0.15	2.78	1.69	-1.09	-39.36
Prostate cancer	0.89	0.15	0.12	2.61	1.48	0.011	0.009	0.25	0.16	3.03	1.77	-1.26	-41.61
Other cancers	5.92	1.00	0.82	16.96	10.06	0.072	0.059	1.64	1.06	19.67	12.00	-7.68	-39.02
Diabetes	4.54	1.26	1.09	10.29	8.07	0.101	0.087	1.10	0.85	12.75	10.10	-2.65	-20.76
Heart disease	4.78	2.45	1.60	8.89	4.86	0.240	0.157	0.86	0.47	12.44	7.09	-5.35	-43.01
Asthma	3.49	1.81	1.56	6.45	5.24	0.132	0.113	0.63	0.51	9.01	7.42	-1.60	-17.74
Hypertension	11.78	4.46	3.63	23.17	18.33	0.438	0.357	2.25	1.78	30.32	24.09	-6.23	-20.55
Stroke	1.03	0.42	0.34	1.83	1.39	0.031	0.024	0.18	0.14	2.46	1.89	-0.58	-23.35
Emotional disturbances	8.06	2.53	2.22	18.40	15.46	0.184	0.161	1.76	1.48	22.87	19.32	-3.55	-15.54
Total	43.35	14.47	11.69	95.11	68.84	1.24	0.99	9.30	6.87	120.11	88.39	-31.72	-26.41

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	9.30	24.53	28.29	30.13	1.84	6.49	34.90	40.97	6.07	17.40
Capital stock (US$ Billions)	344.15	885.13	1533.86	1589.64	55.78	3.64	3847.26	4222.33	375.07	9.72
Life expectancy at 65 (years)	14.64	17.71	19.37	20.48	1.11	5.74	22.14	24.28	2.14	9.66
GDP* by state (US$ Billions)	91.04	394.69	581.48	622.43	40.95	7.04	854.34	1004.86	150.53	17.62

*Based on Real GDP

Oklahoma

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	135	3,941	0.53	199	164	7,649	6,914	1.52	1.13	-35	-17.81	-734	-9.60	-0.39	-25.70
Breast cancer	14	3,977	0.06	19	17	7,638	6,900	0.15	0.12	-2	-12.30	-738	-9.66	-0.03	-20.77
Colon cancer	4	10,696	0.05	5	4	22,472	20,311	0.12	0.09	-1	-17.67	-2,162	-9.62	-0.03	-25.59
Lung cancer	5	15,518	0.08	7	5	29,879	26,993	0.20	0.14	-1	-18.44	-2,886	-9.66	-0.05	-26.32
Prostate cancer	13	3,170	0.04	20	16	6,231	5,629	0.13	0.09	-4	-21.48	-601	-9.65	-0.04	-29.06
Other cancers	98	3,190	0.31	147	121	6,330	5,719	0.93	0.69	-27	-18.00	-611	-9.65	-0.24	-25.91
Diabetes	158	1,674	0.26	211	183	3,297	2,979	0.69	0.54	-28	-13.30	-318	-9.65	-0.15	-21.66
Heart disease	318	3,010	0.95	390	255	6,278	5,674	2.45	1.45	-135	-34.63	-604	-9.62	-1.00	-40.92
Pulmonary conditions	674	780	0.52	824	708	1,589	1,436	1.31	1.02	-116	-14.05	-153	-9.63	-0.29	-22.33
Hypertension	485	818	0.40	599	487	1,614	1,459	0.97	0.71	-112	-18.70	-156	-9.65	-0.26	-26.54
Stroke	38	5,376	0.20	42	34	11,420	10,322	0.48	0.35	-8	-18.84	-1,098	-9.61	-0.13	-26.65
Mental disorders	360	1,088	0.39	499	437	2,125	1,920	1.06	0.84	-62	-12.35	-205	-9.65	-0.22	-20.81
Total	2,169	1,508	3.27	2,763	2,268	3,541	3,200	8.48	6.04	-496	-17.94	-341	-9.63	-2.44	-28.78

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	3.47	0.57	0.46	9.58	5.69	0.041	0.033	0.93	0.60	11.11	6.79	-4.32	-38.88
Breast cancer	0.37	0.05	0.05	0.93	0.59	0.004	0.003	0.09	0.06	1.08	0.70	-0.38	-34.82
Colon cancer	0.30	0.04	0.04	0.74	0.44	0.003	0.003	0.07	0.05	0.86	0.53	-0.33	-38.78
Lung cancer	0.54	0.07	0.06	1.23	0.73	0.005	0.004	0.12	0.08	1.43	0.87	-0.56	-39.39
Prostate cancer	0.26	0.05	0.04	0.80	0.45	0.003	0.003	0.08	0.05	0.93	0.54	-0.39	-41.64
Other cancers	2.00	0.35	0.28	5.87	3.48	0.025	0.020	0.57	0.37	6.81	4.15	-2.66	-39.05
Diabetes	1.21	0.35	0.30	2.84	2.22	0.028	0.024	0.30	0.24	3.51	2.78	-0.73	-20.76
Heart disease	1.74	0.91	0.59	3.29	1.80	0.089	0.058	0.32	0.17	4.60	2.62	-1.98	-43.01
Asthma	1.28	0.68	0.58	2.42	1.97	0.049	0.043	0.23	0.19	3.38	2.78	-0.60	-17.74
Hypertension	3.69	1.44	1.17	7.50	5.93	0.142	0.115	0.73	0.58	9.82	7.80	-2.02	-20.55
Stroke	0.35	0.14	0.12	0.62	0.47	0.010	0.008	0.06	0.05	0.83	0.64	-0.19	-23.35
Emotional disturbances	2.03	0.67	0.59	4.89	4.11	0.049	0.043	0.47	0.39	6.08	5.13	-0.94	-15.54
Total	13.76	4.76	3.82	31.14	22.19	0.41	0.32	3.04	2.22	39.34	28.56	-10.79	-27.42

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	10.00	21.93	27.68	29.48	1.80	6.51	34.43	40.41	5.98	17.35
Capital stock (US$ Billions)	72.15	298.47	438.24	454.22	15.99	3.64	1253.05	1374.89	121.83	9.72
Life expectancy at 65 (years)	15.47	17.21	18.82	19.90	1.08	5.76	21.52	23.59	2.07	9.64
GDP* by state (US$ Billions)	16.92	99.98	152.79	163.58	10.79	7.06	248.22	291.83	43.61	17.57

*Based on Real GDP

Oregon

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
				PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	123	4,160	0.51	203	167	8,558	7,664	1.74	1.28	-36	-17.80	-893	-10.44	-0.46	-26.38
Breast cancer	13	4,667	0.06	19	17	9,539	8,536	0.18	0.14	-2	-12.30	-1,003	-10.52	-0.04	-21.52
Colon cancer	4	10,916	0.05	6	5	24,613	22,036	0.14	0.11	-1	-17.67	-2,577	-10.47	-0.04	-26.29
Lung cancer	5	16,127	0.09	7	6	33,053	29,577	0.24	0.18	-1	-18.44	-3,476	-10.52	-0.07	-27.02
Prostate cancer	10	3,785	0.04	19	15	7,932	7,099	0.15	0.11	-4	-21.48	-833	-10.51	-0.05	-29.73
Other cancers	90	3,157	0.28	151	124	6,686	5,984	1.01	0.74	-27	-18.00	-702	-10.50	-0.27	-26.61
Diabetes	138	1,870	0.26	222	192	3,930	3,517	0.87	0.68	-29	-13.30	-413	-10.50	-0.20	-22.40
Heart disease	190	3,236	0.62	274	179	7,237	6,479	1.98	1.16	-95	-34.63	-758	-10.47	-0.82	-41.47
Pulmonary conditions	590	825	0.49	809	695	1,798	1,609	1.45	1.12	-114	-14.05	-189	-10.49	-0.34	-23.07
Hypertension	377	839	0.32	533	434	1,766	1,580	0.94	0.69	-100	-18.70	-185	-10.50	-0.26	-27.24
Stroke	35	5,394	0.19	48	39	12,309	11,021	0.59	0.43	-9	-18.84	-1,288	-10.46	-0.16	-27.33
Mental disorders	627	1,674	1.06	1,001	878	3,486	3,119	3.49	2.74	-124	-12.35	-366	-10.51	-0.75	-21.56
Total	2,080	1,653	3.44	3,090	2,583	4,038	3,614	11.06	8.08	-506	-16.39	-423	-10.49	-2.98	-26.94

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	3.14	0.58	0.47	9.77	5.81	0.042	0.034	0.94	0.61	11.33	6.93	-4.40	-38.87
Breast cancer	0.36	0.06	0.05	1.03	0.66	0.004	0.004	0.10	0.07	1.20	0.78	-0.42	-34.84
Colon cancer	0.29	0.05	0.04	0.81	0.48	0.003	0.003	0.08	0.05	0.94	0.58	-0.37	-38.79
Lung cancer	0.52	0.08	0.07	1.38	0.81	0.006	0.005	0.13	0.09	1.60	0.97	-0.63	-39.40
Prostate cancer	0.24	0.05	0.04	0.86	0.49	0.004	0.003	0.08	0.05	1.00	0.58	-0.42	-41.65
Other cancers	1.73	0.34	0.27	5.68	3.37	0.024	0.020	0.55	0.36	6.59	4.01	-2.57	-39.07
Diabetes	1.06	0.37	0.32	2.98	2.34	0.029	0.025	0.32	0.25	3.69	2.93	-0.77	-20.76
Heart disease	1.04	0.64	0.42	2.31	1.26	0.062	0.041	0.22	0.12	3.24	1.84	-1.39	-43.01
Asthma	1.12	0.67	0.57	2.38	1.93	0.048	0.042	0.23	0.19	3.32	2.73	-0.59	-17.74
Hypertension	2.87	1.29	1.05	6.68	5.29	0.126	0.103	0.65	0.51	8.75	6.95	-1.80	-20.55
Stroke	0.32	0.16	0.13	0.70	0.53	0.012	0.009	0.07	0.05	0.94	0.72	-0.22	-23.35
Emotional disturbances	3.53	1.35	1.18	9.81	8.24	0.098	0.086	0.94	0.79	12.20	10.30	-1.89	-15.54
Total	13.08	5.04	4.14	34.63	25.40	0.42	0.34	3.37	2.53	43.46	32.40	-11.06	-25.45

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	11.80	26.90	30.34	32.31	1.97	6.51	37.98	44.59	6.61	17.40
Capital stock (US$ Billions)	67.00	192.64	410.48	425.45	14.96	3.64	1485.73	1630.58	144.85	9.72
Life expectancy at 65 (years)	15.57	18.59	20.33	21.50	1.17	5.76	23.24	25.49	2.25	9.66
GDP* by state (US$ Billions)	15.22	125.11	170.17	182.18	12.01	7.06	356.51	419.33	62.82	17.62

*Based on Real GDP

Pennsylvania

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	485	4,847	2.35	686	564	8,144	7,504	5.59	4.23	-122	-17.78	-641	-7.87	-1.36	-24.25
Breast cancer	59	5,507	0.32	72	63	9,355	8,612	0.68	0.55	-9	-12.30	-742	-7.94	-0.13	-19.26
Colon cancer	15	11,477	0.17	16	13	20,974	19,315	0.34	0.26	-3	-17.67	-1,659	-7.91	-0.08	-24.18
Lung cancer	17	17,953	0.31	20	16	30,558	28,133	0.61	0.46	-4	-18.44	-2,425	-7.93	-0.15	-24.92
Prostate cancer	49	4,869	0.24	74	58	8,426	7,758	0.62	0.45	-16	-21.48	-668	-7.93	-0.17	-27.70
Other cancers	346	3,797	1.31	504	413	6,623	6,098	3.34	2.52	-91	-18.00	-525	-7.93	-0.82	-24.50
Diabetes	709	2,054	1.46	920	798	3,562	3,279	3.28	2.62	-122	-13.30	-282	-7.93	-0.66	-20.17
Heart disease	1,017	2,894	2.94	1,198	783	5,256	4,840	6.30	3.79	-415	-34.63	-416	-7.91	-2.51	-39.80
Pulmonary conditions	2,167	861	1.86	2,588	2,224	1,534	1,412	3.97	3.14	-364	-14.05	-121	-7.92	-0.83	-20.86
Hypertension	1,684	887	1.50	2,036	1,655	1,540	1,418	3.14	2.35	-381	-18.70	-122	-7.93	-0.79	-25.14
Stroke	135	5,764	0.78	150	122	10,629	9,788	1.59	1.19	-28	-18.84	-840	-7.90	-0.40	-25.26
Mental disorders	1,582	1,705	2.68	2,088	1,830	2,937	2,704	6.13	4.95	-258	-12.35	-233	-7.93	-1.18	-19.30
Total	7,780	1,745	13.57	9,666	7,976	3,587	3,303	29.99	22.27	-1,690	-17.48	-284	-7.91	-7.72	-25.75

Direct Costs

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	12.44	1.95	1.60	33.04	19.64	0.141	0.115	3.20	2.08	38.33	23.43	-14.89	-38.86
Breast cancer	1.70	0.24	0.21	3.99	2.53	0.017	0.015	0.39	0.27	4.63	3.02	-1.61	-34.83
Colon cancer	0.88	0.12	0.10	2.01	1.20	0.009	0.007	0.19	0.13	2.34	1.43	-0.91	-38.80
Lung cancer	1.66	0.21	0.17	3.63	2.14	0.015	0.013	0.35	0.23	4.21	2.55	-1.66	-39.40
Prostate cancer	1.25	0.22	0.17	3.69	2.09	0.016	0.012	0.36	0.22	4.28	2.50	-1.78	-41.65
Other cancers	6.94	1.17	0.95	19.72	11.69	0.084	0.069	1.91	1.24	22.88	13.94	-8.94	-39.06
Diabetes	5.41	1.52	1.31	12.39	9.71	0.121	0.104	1.32	1.03	15.35	12.16	-3.19	-20.76
Heart disease	5.56	2.78	1.82	10.11	5.53	0.273	0.178	0.98	0.53	14.14	8.06	-6.08	-43.01
Asthma	4.13	2.14	1.84	7.60	6.18	0.155	0.134	0.74	0.60	10.63	8.75	-1.89	-17.74
Hypertension	12.81	4.91	4.00	25.52	20.18	0.483	0.393	2.48	1.96	33.39	26.53	-6.86	-20.55
Stroke	1.23	0.50	0.41	2.19	1.66	0.036	0.029	0.21	0.16	2.94	2.25	-0.69	-23.35
Emotional disturbances	8.91	2.81	2.46	20.45	17.19	0.204	0.178	1.96	1.65	25.43	21.48	-3.95	-15.54
Total	50.48	16.61	13.43	111.30	80.09	1.41	1.13	10.88	8.01	140.21	102.66	-37.55	-26.78

Indirect Impacts* (US$ Billions)

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	8.70	25.57	28.06	29.90	1.84	6.54	34.62	40.64	6.02	17.40
Capital stock (US$ Billions)	417.81	673.67	1225.46	1270.39	44.93	3.64	3123.71	3428.25	304.54	9.72
Life expectancy at 65 (years)	14.35	18.23	19.93	21.08	1.15	5.79	22.79	24.99	2.20	9.66
GDP* by state (US$ Billions)	97.20	428.05	591.14	633.11	41.96	7.10	894.04	1051.57	157.53	17.62

*Based on Real GDP

Rhode Island

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	44	4,734	0.21	63	52	8,993	8,142	0.57	0.42	-11	-17.77	-852	-9.47	-0.14	-25.56
Breast cancer	5	5,202	0.03	7	6	9,889	8,948	0.07	0.05	-1	-12.30	-941	-9.52	-0.01	-20.64
Colon cancer	1	11,733	0.02	1	1	24,364	22,055	0.04	0.03	0	-17.67	-2,309	-9.48	-0.01	-25.47
Lung cancer	2	17,331	0.03	2	2	33,024	29,882	0.07	0.05	0	-18.44	-3,142	-9.52	-0.02	-26.21
Prostate cancer	4	4,727	0.02	7	5	9,192	8,318	0.06	0.05	-1	-21.48	-874	-9.51	-0.02	-28.94
Other cancers	31	3,709	0.12	46	37	7,280	6,588	0.33	0.25	-8	-18.00	-692	-9.50	-0.09	-25.79
Diabetes	52	2,129	0.11	72	63	4,148	3,754	0.30	0.24	-10	-13.30	-394	-9.51	-0.06	-21.54
Heart disease	80	2,980	0.24	100	65	6,143	5,561	0.61	0.36	-34	-34.63	-582	-9.48	-0.25	-40.82
Pulmonary conditions	218	894	0.19	262	225	1,800	1,629	0.47	0.37	-37	-14.05	-171	-9.49	-0.10	-22.21
Hypertension	160	927	0.15	201	163	1,809	1,637	0.36	0.27	-38	-18.70	-172	-9.50	-0.10	-26.42
Stroke	9	6,014	0.06	11	9	12,624	11,428	0.14	0.10	-2	-18.84	-1,196	-9.47	-0.04	-26.53
Mental disorders	149	1,742	0.26	206	180	3,367	3,047	0.69	0.55	-25	-12.35	-320	-9.51	-0.14	-20.68
Total	713	1,705	1.22	914	757	3,943	3,569	3.14	2.30	-157	-17.18	-374	-9.49	-0.84	-26.71

Indirect Impacts* (US$ Billions)												
	2003	2023										
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	1.12	0.18	0.15	3.03	1.80	0.013	0.011	0.29	0.19	3.52	2.15	-1.37	-38.85
Breast cancer	0.15	0.02	0.02	0.36	0.23	0.002	0.001	0.04	0.02	0.42	0.27	-0.15	-34.81
Colon cancer	0.08	0.01	0.01	0.19	0.12	0.001	0.001	0.02	0.01	0.23	0.14	-0.09	-38.78
Lung cancer	0.16	0.02	0.02	0.35	0.21	0.002	0.001	0.03	0.02	0.41	0.25	-0.16	-39.38
Prostate cancer	0.11	0.02	0.02	0.34	0.19	0.001	0.001	0.03	0.02	0.40	0.23	-0.16	-41.63
Other cancers	0.62	0.11	0.09	1.78	1.06	0.008	0.006	0.17	0.11	2.07	1.26	-0.81	-39.04
Diabetes	0.40	0.12	0.10	0.97	0.76	0.010	0.008	0.10	0.08	1.21	0.96	-0.25	-20.76
Heart disease	0.44	0.23	0.15	0.84	0.46	0.023	0.015	0.08	0.04	1.18	0.67	-0.51	-43.01
Asthma	0.42	0.22	0.19	0.77	0.63	0.016	0.014	0.07	0.06	1.08	0.89	-0.19	-17.74
Hypertension	1.22	0.48	0.39	2.52	1.99	0.048	0.039	0.24	0.19	3.29	2.62	-0.68	-20.55
Stroke	0.08	0.04	0.03	0.16	0.12	0.003	0.002	0.02	0.01	0.22	0.17	-0.05	-23.35
Emotional disturbances	0.84	0.28	0.24	2.01	1.69	0.020	0.018	0.19	0.16	2.50	2.12	-0.39	-15.54
Total	4.52	1.54	1.25	10.31	7.46	0.13	0.11	1.01	0.74	12.99	9.56	-3.43	-26.40

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	9.40	28.37	31.25	33.28	2.03	6.49	38.45	45.13	6.68	17.36
Capital stock (US$ Billions)	27.77	292.98	561.46	581.89	20.43	3.64	1432.32	1571.63	139.31	9.72
Life expectancy at 65 (years)	14.96	18.89	20.66	21.85	1.19	5.75	23.62	25.90	2.28	9.64
GDP* by state (US$ Billions)	9.03	38.19	71.73	76.78	5.05	7.05	110.52	129.94	19.43	17.58

*Based on Real GDP

South Carolina

Direct Costs

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	164	4,206	0.69	285	234	8,864	7,894	2.53	1.85	-51	-17.85	-970	-10.95	-0.68	-26.85
Breast cancer	16	4,181	0.07	28	24	8,866	7,889	0.25	0.19	-3	-12.30	-977	-11.02	-0.05	-21.96
Colon cancer	5	11,688	0.06	7	6	27,474	24,461	0.20	0.15	-1	-17.67	-3,013	-10.97	-0.05	-26.70
Lung cancer	6	16,370	0.09	8	6	34,811	30,976	0.27	0.19	-1	-18.44	-3,835	-11.02	-0.07	-27.43
Prostate cancer	18	3,372	0.06	33	26	7,341	6,533	0.24	0.17	-7	-21.48	-808	-11.01	-0.07	-30.12
Other cancers	119	3,405	0.40	210	172	7,495	6,670	1.57	1.15	-38	-18.00	-824	-11.00	-0.42	-27.02
Diabetes	242	1,839	0.44	384	333	4,016	3,574	1.54	1.19	-51	-13.30	-442	-11.00	-0.35	-22.84
Heart disease	273	3,302	0.90	442	289	7,696	6,852	3.40	1.98	-153	-34.63	-844	-10.97	-1.42	-41.80
Pulmonary conditions	640	861	0.55	872	750	1,952	1,737	1.70	1.30	-123	-14.05	-214	-10.98	-0.40	-23.49
Hypertension	591	905	0.53	861	700	1,980	1,762	1.70	1.23	-161	-18.70	-218	-11.00	-0.47	-27.64
Stroke	42	5,932	0.25	59	48	14,121	12,573	0.83	0.60	-11	-18.84	-1,548	-10.96	-0.23	-27.74
Mental disorders	564	1,185	0.66	894	783	2,563	2,281	2.29	1.79	-110	-12.35	-282	-11.01	-0.50	-22.00
Total	2,516	1,598	4.02	3,797	3,137	4,171	3,713	14.00	9.94	-660	-17.38	-458	-10.98	-4.06	-28.98

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	4.20	0.81	0.66	13.74	8.16	0.059	0.048	1.33	0.86	15.93	9.73	-6.20	-38.91
Breast cancer	0.42	0.08	0.07	1.33	0.84	0.006	0.005	0.13	0.09	1.54	1.01	-0.54	-34.83
Colon cancer	0.38	0.07	0.05	1.10	0.66	0.005	0.004	0.11	0.07	1.28	0.78	-0.50	-38.79
Lung cancer	0.56	0.09	0.07	1.46	0.86	0.006	0.005	0.14	0.09	1.69	1.02	-0.67	-39.40
Prostate cancer	0.37	0.08	0.06	1.31	0.74	0.006	0.004	0.13	0.08	1.52	0.89	-0.63	-41.65
Other cancers	2.47	0.50	0.41	8.54	5.06	0.036	0.030	0.83	0.54	9.90	6.04	-3.87	-39.06
Diabetes	1.84	0.63	0.55	5.17	4.06	0.051	0.044	0.55	0.43	6.41	5.08	-1.33	-20.76
Heart disease	1.49	1.02	0.67	3.73	2.04	0.101	0.066	0.36	0.20	5.21	2.97	-2.24	-43.01
Asthma	1.22	0.72	0.62	2.56	2.08	0.052	0.045	0.25	0.20	3.58	2.95	-0.64	-17.74
Hypertension	4.49	2.08	1.69	10.79	8.54	0.204	0.166	1.05	0.83	14.12	11.22	-2.90	-20.55
Stroke	0.38	0.20	0.16	0.86	0.65	0.014	0.011	0.08	0.06	1.16	0.89	-0.27	-23.35
Emotional disturbances	3.18	1.20	1.05	8.75	7.36	0.087	0.076	0.84	0.71	10.88	9.19	-1.69	-15.54
Total	16.81	6.67	5.41	45.61	32.88	0.57	0.46	4.46	3.29	57.31	42.03	-15.27	-26.65

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	9.00	23.00	25.40	27.05	1.65	6.51	31.72	37.23	5.51	17.38
Capital stock (US$ Billions)	61.31	262.50	490.27	508.14	17.88	3.64	1474.89	1618.49	143.60	9.72
Life expectancy at 65 (years)	14.47	17.74	19.40	20.52	1.12	5.76	22.18	24.32	2.14	9.65
GDP* by state (US$ Billions)	21.65	127.27	217.40	232.75	15.35	7.06	376.47	442.71	66.24	17.60

*Based on Real GDP

South Dakota

Direct Costs														
	2003			2023										
				Projections - Level						Projections - Difference				
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	29	5,495	0.16	42	35	11,756	10,481	0.50	0.36	-8	-17.97	-1,276	-10.85	-0.13	-26.87
Breast cancer	3	5,257	0.01	4	3	11,008	9,814	0.04	0.03	0	-12.30	-1,194	-10.85	-0.01	-21.81
Colon cancer	1	14,197	0.01	1	1	32,903	29,350	0.04	0.03	0	-17.67	-3,553	-10.80	-0.01	-26.56
Lung cancer	1	18,220	0.02	1	1	38,262	34,111	0.05	0.04	0	-18.44	-4,151	-10.85	-0.01	-27.29
Prostate cancer	3	5,090	0.02	5	4	10,940	9,755	0.06	0.04	-1	-21.48	-1,185	-10.84	-0.02	-29.99
Other cancers	21	4,647	0.10	31	25	10,095	9,001	0.31	0.23	-6	-18.00	-1,093	-10.83	-0.08	-26.88
Diabetes	32	2,191	0.07	50	43	4,722	4,210	0.24	0.18	-7	-13.30	-512	-10.83	-0.05	-22.69
Heart disease	55	4,639	0.26	72	47	10,663	9,511	0.77	0.45	-25	-34.63	-1,152	-10.80	-0.32	-41.69
Pulmonary conditions	126	1,233	0.16	156	134	2,757	2,459	0.43	0.33	-22	-14.05	-298	-10.82	-0.10	-23.35
Hypertension	98	837	0.08	124	101	1,807	1,611	0.22	0.16	-23	-18.70	-196	-10.83	-0.06	-27.50
Stroke	8	6,152	0.05	9	8	14,435	12,878	0.13	0.10	-2	-18.84	-1,558	-10.79	-0.04	-27.60
Mental disorders	89	1,632	0.14	121	106	3,484	3,106	0.42	0.33	-15	-12.35	-378	-10.84	-0.09	-21.85
Total	436	2,101	0.92	575	474	5,434	4,846	2.71	1.91	-101	-17.57	-588	-10.82	-0.80	-29.44

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	0.73	0.12	0.10	2.03	1.20	0.009	0.007	0.20	0.13	2.35	1.43	-0.92	-39.00
Breast cancer	0.06	0.01	0.01	0.16	0.10	0.001	0.001	0.02	0.01	0.18	0.12	-0.06	-34.78
Colon cancer	0.06	0.01	0.01	0.14	0.09	0.001	0.001	0.01	0.01	0.17	0.10	-0.06	-38.74
Lung cancer	0.09	0.01	0.01	0.21	0.12	0.001	0.001	0.02	0.01	0.24	0.15	-0.10	-39.35
Prostate cancer	0.07	0.01	0.01	0.24	0.14	0.001	0.001	0.02	0.01	0.28	0.16	-0.11	-41.60
Other cancers	0.44	0.08	0.06	1.28	0.76	0.005	0.004	0.12	0.08	1.48	0.90	-0.58	-39.01
Diabetes	0.24	0.08	0.07	0.67	0.53	0.007	0.006	0.07	0.06	0.83	0.66	-0.17	-20.76
Heart disease	0.30	0.17	0.11	0.61	0.33	0.016	0.011	0.06	0.03	0.85	0.48	-0.36	-43.01
Asthma	0.24	0.13	0.11	0.46	0.37	0.009	0.008	0.04	0.04	0.64	0.53	-0.11	-17.74
Hypertension	0.74	0.30	0.24	1.56	1.23	0.029	0.024	0.15	0.12	2.04	1.62	-0.42	-20.55
Stroke	0.07	0.03	0.03	0.14	0.10	0.002	0.002	0.01	0.01	0.18	0.14	-0.04	-23.35
Emotional disturbances	0.50	0.16	0.14	1.19	1.00	0.012	0.010	0.11	0.10	1.47	1.24	-0.23	-15.54
Total	2.83	0.99	0.80	6.64	4.76	0.08	0.07	0.65	0.48	8.37	6.11	-2.26	-26.99

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	8.60	23.70	27.13	28.90	1.77	6.53	33.65	39.49	5.84	17.36
Capital stock (US$ Billions)	18.78	80.52	147.15	152.54	5.38	3.64	368.21	404.02	35.81	9.72
Life expectancy at 65 (years)	15.82	19.17	20.96	22.17	1.21	5.78	23.97	26.28	2.31	9.64
GDP* by state (US$ Billions)	4.20	27.18	39.26	42.05	2.78	7.08	56.30	66.20	9.90	17.58

*Based on Real GDP

Tennessee

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	260	4,812	1.25	436	358	9,198	8,315	4.01	2.98	-78	-17.82	-883	-9.60	-1.03	-25.71
Breast cancer	26	5,079	0.13	39	34	9,771	8,825	0.38	0.30	-5	-12.30	-946	-9.68	-0.08	-20.79
Colon cancer	8	12,420	0.10	10	8	26,145	23,624	0.27	0.20	-2	-17.67	-2,521	-9.64	-0.07	-25.61
Lung cancer	10	18,986	0.18	13	10	36,617	33,072	0.47	0.34	-2	-18.44	-3,545	-9.68	-0.12	-26.34
Prostate cancer	23	3,900	0.09	41	32	7,678	6,935	0.31	0.22	-9	-21.48	-743	-9.67	-0.09	-29.07
Other cancers	193	3,895	0.75	333	273	7,742	6,994	2.58	1.91	-60	-18.00	-749	-9.67	-0.67	-25.93
Diabetes	344	2,134	0.73	498	431	4,211	3,804	2.10	1.64	-66	-13.30	-407	-9.67	-0.45	-21.68
Heart disease	458	3,527	1.60	636	416	7,368	6,658	4.69	2.77	-220	-34.63	-711	-9.65	-1.92	-40.93
Pulmonary conditions	1,167	957	1.11	1,600	1,375	1,953	1,764	3.12	2.43	-225	-14.05	-189	-9.66	-0.70	-22.35
Hypertension	876	1,066	0.93	1,185	964	2,107	1,904	2.50	1.83	-222	-18.70	-204	-9.67	-0.66	-26.56
Stroke	59	6,141	0.36	75	61	13,070	11,811	0.98	0.72	-14	-18.84	-1,260	-9.64	-0.26	-26.66
Mental disorders	624	1,391	0.86	964	845	2,722	2,458	2.62	2.08	-119	-12.35	-263	-9.68	-0.55	-20.83
Total	3,788	1,810	6.86	5,394	4,450	4,300	3,885	20.02	14.44	-944	-17.50	-415	-9.65	-5.57	-27.84

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	6.66	1.24	1.01	20.98	12.47	0.089	0.073	2.03	1.32	24.34	14.88	-9.47	-38.89
Breast cancer	0.70	0.12	0.10	2.01	1.27	0.009	0.007	0.19	0.13	2.33	1.52	-0.81	-34.84
Colon cancer	0.51	0.08	0.07	1.40	0.83	0.006	0.005	0.14	0.09	1.62	0.99	-0.63	-38.80
Lung cancer	0.96	0.14	0.12	2.45	1.44	0.010	0.008	0.24	0.15	2.84	1.72	-1.12	-39.41
Prostate cancer	0.48	0.10	0.08	1.64	0.93	0.007	0.005	0.16	0.10	1.90	1.11	-0.79	-41.65
Other cancers	4.00	0.80	0.65	13.49	7.99	0.058	0.047	1.30	0.85	15.65	9.53	-6.11	-39.07
Diabetes	2.62	0.82	0.71	6.70	5.25	0.066	0.056	0.71	0.56	8.30	6.58	-1.72	-20.76
Heart disease	2.50	1.48	0.97	5.37	2.94	0.145	0.095	0.52	0.28	7.51	4.28	-3.23	-43.01
Asthma	2.22	1.32	1.14	4.70	3.82	0.096	0.083	0.46	0.37	6.57	5.41	-1.17	-17.74
Hypertension	6.66	2.86	2.33	14.86	11.75	0.281	0.229	1.44	1.14	19.44	15.45	-4.00	-20.55
Stroke	0.54	0.25	0.20	1.09	0.83	0.018	0.015	0.11	0.08	1.47	1.12	-0.34	-23.35
Emotional disturbances	3.52	1.30	1.14	9.44	7.94	0.094	0.082	0.91	0.76	11.74	9.92	-1.82	-15.54
Total	24.72	9.27	7.49	63.15	44.99	0.79	0.63	6.17	4.51	79.38	57.63	-21.75	-27.40

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	7.90	22.00	26.38	28.09	1.71	6.50	32.34	37.97	5.63	17.40
Capital stock (US$ Billions)	115.25	315.80	647.21	670.78	23.57	3.64	2020.69	2217.67	196.99	9.72
Life expectancy at 65 (years)	14.89	17.19	18.80	19.88	1.08	5.75	21.49	23.57	2.08	9.66
GDP* by state (US$ Billions)	30.62	198.56	306.34	327.93	21.60	7.05	527.65	620.61	92.96	17.62

*Based on Real GDP

Texas

Direct Costs

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	797	4,199	3.35	1,450	1,192	8,425	7,568	12.21	9.02	-258	-17.78	-857	-10.18	-3.19	-26.15
Breast cancer	84	4,274	0.36	147	129	8,565	7,687	1.26	0.99	-18	-12.30	-878	-10.25	-0.27	-21.29
Colon cancer	26	11,202	0.29	39	32	24,701	22,181	0.96	0.71	-7	-17.67	-2,520	-10.20	-0.25	-26.07
Lung cancer	27	16,662	0.45	42	34	33,483	30,052	1.39	1.02	-8	-18.44	-3,431	-10.25	-0.37	-26.80
Prostate cancer	73	3,384	0.25	146	115	6,951	6,239	1.02	0.72	-31	-21.48	-712	-10.24	-0.30	-29.52
Other cancers	587	3,399	1.99	1,076	883	7,052	6,331	7.59	5.59	-194	-18.00	-722	-10.23	-2.00	-26.39
Diabetes	1,122	1,698	1.90	1,921	1,666	3,497	3,139	6.72	5.23	-255	-13.30	-358	-10.24	-1.49	-22.17
Heart disease	1,201	3,131	3.73	1,938	1,267	6,850	6,151	13.27	7.79	-671	-34.63	-699	-10.21	-5.48	-41.30
Pulmonary conditions	3,857	798	3.07	5,566	4,784	1,702	1,528	9.47	7.31	-782	-14.05	-174	-10.22	-2.16	-22.84
Hypertension	2,689	820	2.20	4,244	3,450	1,691	1,518	7.18	5.24	-793	-18.70	-173	-10.23	-1.94	-27.02
Stroke	158	5,576	0.88	231	188	12,439	11,171	2.88	2.10	-44	-18.84	-1,268	-10.20	-0.78	-27.12
Mental disorders	1,866	1,114	2.06	3,291	2,885	2,273	2,040	7.48	5.88	-406	-12.35	-233	-10.24	-1.59	-21.32
Total	11,690	1,470	17.18	18,641	15,431	3,687	3,310	59.21	42.57	-3,210	-17.22	-377	-10.22	-16.64	-28.11

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	20.44	4.13	3.37	69.78	41.49	0.30	0.24	6.75	4.39	80.96	49.50	-31.46	-38.86
Breast cancer	2.21	0.43	0.37	7.19	4.55	0.03	0.03	0.70	0.48	8.34	5.43	-2.90	-34.83
Colon cancer	1.77	0.32	0.27	5.48	3.26	0.02	0.02	0.53	0.35	6.36	3.89	-2.47	-38.79
Lung cancer	2.76	0.47	0.38	7.94	4.68	0.03	0.03	0.77	0.50	9.21	5.58	-3.63	-39.40
Prostate cancer	1.51	0.34	0.27	5.80	3.29	0.02	0.02	0.56	0.35	6.73	3.93	-2.80	-41.65
Other cancers	12.18	2.57	2.09	43.37	25.70	0.18	0.15	4.19	2.72	50.31	30.66	-19.65	-39.06
Diabetes	8.56	3.17	2.75	25.87	20.28	0.25	0.22	2.76	2.15	32.05	25.39	-6.65	-20.76
Heart disease	6.56	4.50	2.94	16.35	8.94	0.44	0.29	1.58	0.86	22.87	13.04	-9.84	-43.01
Asthma	7.34	4.60	3.95	16.35	13.29	0.33	0.29	1.59	1.29	22.87	18.81	-4.06	-17.74
Hypertension	20.45	10.24	8.33	53.19	42.07	1.01	0.82	5.16	4.08	69.60	55.29	-14.31	-20.55
Stroke	1.44	0.78	0.63	3.38	2.56	0.06	0.04	0.33	0.25	4.54	3.48	-1.06	-23.35
Emotional disturbances	10.51	4.43	3.88	32.24	27.09	0.32	0.28	3.09	2.60	40.08	33.86	-6.23	-15.54
Total	75.30	31.83	25.85	217.17	155.72	2.71	2.18	21.26	15.62	272.97	199.37	-73.60	-26.96

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	10.90	24.90	28.40	30.25	1.85	6.52	35.66	41.86	6.20	17.38
Capital stock (US$ Billions)	373.68	1162.92	2716.74	2815.91	99.17	3.64	10739.49	11785.20	1045.71	9.72
Life expectancy at 65 (years)	15.38	18.18	19.88	21.03	1.15	5.76	22.73	24.92	2.19	9.65
GDP* by state (US$ Billions)	96.82	815.68	1273.57	1364.75	91.18	7.16	2946.70	3466.98	520.27	17.66

*Based on Real GDP

Utah

Direct Costs															
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	71	3,335	0.24	128	105	6,848	6,090	0.87	0.64	-23	-17.95	-758	-11.07	-0.24	-27.03
Breast cancer	7	3,577	0.02	12	10	7,671	6,814	0.09	0.07	-1	-12.30	-857	-11.17	-0.02	-22.10
Colon cancer	3	9,326	0.02	4	3	22,202	19,734	0.08	0.06	-1	-17.67	-2,468	-11.12	-0.02	-26.82
Lung cancer	2	12,895	0.02	2	2	27,732	24,634	0.06	0.05	0	-18.44	-3,098	-11.17	-0.02	-27.55
Prostate cancer	9	3,014	0.03	17	14	6,639	5,898	0.12	0.08	-4	-21.48	-741	-11.16	-0.04	-30.24
Other cancers	52	2,531	0.13	92	76	5,637	5,008	0.52	0.38	-17	-18.00	-629	-11.15	-0.14	-27.15
Diabetes	81	1,636	0.13	155	134	3,614	3,211	0.56	0.43	-21	-13.30	-403	-11.16	-0.13	-22.97
Heart disease	82	2,796	0.23	130	85	6,600	5,866	0.86	0.50	-45	-34.63	-734	-11.12	-0.36	-41.90
Pulmonary conditions	313	720	0.23	456	392	1,652	1,468	0.75	0.58	-64	-14.05	-184	-11.14	-0.18	-23.62
Hypertension	197	739	0.15	311	253	1,635	1,453	0.51	0.37	-58	-18.70	-182	-11.16	-0.14	-27.77
Stroke	12	4,769	0.06	17	14	11,500	10,222	0.20	0.14	-3	-18.84	-1,278	-11.11	-0.06	-27.86
Mental disorders	305	1,436	0.44	525	461	3,141	2,791	1.65	1.29	-65	-12.35	-351	-11.16	-0.37	-22.13
Total	1,060	1,371	1.45	1,723	1,444	3,539	3,145	5.40	3.94	-279	-16.19	-394	-11.14	-1.46	-27.10

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	1.83	0.36	0.30	6.14	3.64	0.026	0.021	0.59	0.39	7.12	4.35	-2.78	-38.98
Breast cancer	0.20	0.04	0.03	0.63	0.40	0.003	0.002	0.06	0.04	0.74	0.48	-0.26	-34.85
Colon cancer	0.20	0.04	0.03	0.59	0.35	0.003	0.002	0.06	0.04	0.69	0.42	-0.27	-38.81
Lung cancer	0.16	0.03	0.02	0.44	0.26	0.002	0.002	0.04	0.03	0.51	0.31	-0.20	-39.42
Prostate cancer	0.21	0.05	0.04	0.81	0.46	0.003	0.003	0.08	0.05	0.94	0.55	-0.39	-41.67
Other cancers	1.06	0.22	0.18	3.66	2.17	0.016	0.013	0.35	0.23	4.24	2.58	-1.66	-39.08
Diabetes	0.61	0.26	0.22	2.09	1.64	0.020	0.018	0.22	0.17	2.59	2.05	-0.54	-20.76
Heart disease	0.45	0.30	0.20	1.10	0.60	0.030	0.019	0.11	0.06	1.53	0.87	-0.66	-43.01
Asthma	0.60	0.38	0.32	1.34	1.09	0.027	0.024	0.13	0.11	1.87	1.54	-0.33	-17.74
Hypertension	1.50	0.75	0.61	3.90	3.09	0.074	0.060	0.38	0.30	5.11	4.06	-1.05	-20.55
Stroke	0.11	0.06	0.05	0.25	0.19	0.004	0.003	0.02	0.02	0.34	0.26	-0.08	-23.35
Emotional disturbances	1.72	0.71	0.62	5.15	4.33	0.051	0.045	0.49	0.41	6.40	5.41	-0.99	-15.54
Total	6.81	2.81	2.32	19.96	14.57	0.23	0.19	1.95	1.45	24.96	18.53	-6.43	-25.75

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	14.00	27.70	32.70	34.82	2.12	6.50	40.91	48.00	7.09	17.34
Capital stock (US$ Billions)	33.43	162.86	388.05	402.17	14.12	3.64	1482.09	1626.08	143.98	9.72
Life expectancy at 65 (years)	15.67	19.00	20.78	21.97	1.19	5.75	23.76	26.05	2.29	9.63
GDP* by state (US$ Billions)	8.73	75.04	142.10	152.11	10.01	7.05	306.04	359.77	53.73	17.56

*Based on Real GDP

Vermont

	Direct Costs															
	2003			2023												
				Projections - Level						Projections - Difference						
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	23	4,616	0.10	38	32	10,334	9,128	0.40	0.29	-7	-17.63	-1,206	-11.67	-0.11	-27.24
Breast cancer	3	5,292	0.02	5	5	11,862	10,466	0.06	0.05	-1	-12.30	-1,396	-11.77	-0.01	-22.62
Colon cancer	1	10,754	0.01	1	1	26,923	23,770	0.02	0.02	0	-17.67	-3,153	-11.71	-0.01	-27.31
Lung cancer	1	17,269	0.01	1	1	38,828	34,258	0.04	0.03	0	-18.44	-4,570	-11.77	-0.01	-28.04
Prostate cancer	2	4,648	0.01	4	3	10,718	9,458	0.05	0.03	-1	-21.48	-1,260	-11.76	-0.01	-30.71
Other cancers	16	3,616	0.06	27	22	8,437	7,446	0.23	0.17	-5	-18.00	-991	-11.75	-0.06	-27.64
Diabetes	26	1,903	0.05	45	39	4,401	3,884	0.20	0.15	-6	-13.30	-517	-11.75	-0.05	-23.49
Heart disease	36	2,701	0.10	60	39	6,701	5,916	0.40	0.23	-21	-34.63	-785	-11.72	-0.17	-42.28
Pulmonary conditions	110	797	0.09	148	127	1,920	1,695	0.28	0.22	-21	-14.05	-225	-11.73	-0.07	-24.14
Hypertension	74	815	0.06	102	83	1,890	1,667	0.19	0.14	-19	-18.70	-222	-11.75	-0.05	-28.25
Stroke	5	5,363	0.03	7	6	13,610	12,017	0.10	0.07	-1	-18.84	-1,593	-11.70	-0.03	-28.34
Mental disorders	89	1,591	0.14	137	120	3,641	3,213	0.50	0.38	-17	-12.35	-428	-11.76	-0.11	-22.66
Total	362	1,563	0.57	539	447	4,344	3,835	2.08	1.49	-92	-17.06	-510	-11.73	-0.59	-28.43

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	0.58	0.11	0.09	1.85	1.10	0.008	0.006	0.18	0.12	2.15	1.31	-0.83	-38.74
Breast cancer	0.09	0.02	0.01	0.29	0.18	0.001	0.001	0.03	0.02	0.33	0.22	-0.12	-34.86
Colon cancer	0.04	0.01	0.01	0.11	0.06	0.000	0.000	0.01	0.01	0.13	0.08	-0.05	-38.80
Lung cancer	0.07	0.01	0.01	0.17	0.10	0.001	0.001	0.02	0.01	0.20	0.12	-0.08	-39.42
Prostate cancer	0.06	0.01	0.01	0.22	0.12	0.001	0.001	0.02	0.01	0.25	0.15	-0.10	-41.67
Other cancers	0.32	0.06	0.05	1.06	0.63	0.005	0.004	0.10	0.07	1.23	0.75	-0.48	-39.08
Diabetes	0.20	0.07	0.06	0.61	0.48	0.006	0.005	0.06	0.05	0.75	0.60	-0.16	-20.76
Heart disease	0.20	0.14	0.09	0.51	0.28	0.014	0.009	0.05	0.03	0.71	0.40	-0.31	-43.01
Asthma	0.21	0.12	0.11	0.44	0.35	0.009	0.008	0.04	0.03	0.61	0.50	-0.11	-17.74
Hypertension	0.56	0.25	0.20	1.28	1.02	0.024	0.020	0.12	0.10	1.68	1.34	-0.35	-20.55
Stroke	0.05	0.02	0.02	0.11	0.08	0.002	0.001	0.01	0.01	0.14	0.11	-0.03	-23.35
Emotional disturbances	0.50	0.18	0.16	1.34	1.12	0.013	0.012	0.13	0.11	1.66	1.41	-0.26	-15.54
Total	2.29	0.90	0.73	6.13	4.43	0.08	0.06	0.60	0.44	7.71	5.67	-2.04	-26.45

* Based on Nominal GDP

	Intergenerational Impacts									
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	11.50	30.37	35.49	37.81	2.32	6.52	43.54	51.10	7.56	17.36
Capital stock (US$ Billions)	14.57	44.43	84.23	87.31	3.08	3.64	236.13	259.10	22.97	9.72
Life expectancy at 65 (years)	14.84	18.73	20.48	21.66	1.18	5.77	23.42	25.68	2.26	9.64
GDP* by state (US$ Billions)	3.86	20.87	33.14	35.49	2.35	7.08	56.26	66.15	9.89	17.58

*Based on Real GDP

Virginia

Direct Costs																
	2003			2023												
				Projections - Level						Projections - Difference						
Chronic Disease	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	279	3,991	1.11	493	405	7,832	7,046	3.86	2.85	-88	-17.80	-786	-10.04	-1.00	-26.05
Breast cancer	30	4,096	0.12	50	44	8,135	7,311	0.41	0.32	-6	-12.30	-824	-10.12	-0.09	-21.18
Colon cancer	9	10,653	0.09	12	10	23,251	20,907	0.29	0.21	-2	-17.67	-2,343	-10.08	-0.08	-25.97
Lung cancer	9	15,641	0.14	13	10	31,148	27,995	0.39	0.29	-2	-18.44	-3,153	-10.12	-0.11	-26.70
Prostate cancer	28	3,217	0.09	52	41	6,547	5,885	0.34	0.24	-11	-21.48	-662	-10.11	-0.10	-29.42
Other cancers	204	3,231	0.66	365	300	6,641	5,970	2.43	1.79	-66	-18.00	-671	-10.11	-0.64	-26.29
Diabetes	333	1,709	0.57	511	443	3,486	3,134	1.78	1.39	-68	-13.30	-352	-10.11	-0.39	-22.06
Heart disease	424	3,004	1.27	660	432	6,506	5,850	4.30	2.53	-229	-34.63	-656	-10.08	-1.77	-41.22
Pulmonary conditions	1,419	790	1.12	1,985	1,706	1,668	1,500	3.31	2.56	-279	-14.05	-168	-10.09	-0.75	-22.73
Hypertension	891	843	0.75	1,280	1,041	1,722	1,548	2.20	1.61	-239	-18.70	-174	-10.11	-0.59	-26.92
Stroke	60	5,317	0.32	84	68	11,739	10,557	0.98	0.72	-16	-18.84	-1,183	-10.07	-0.27	-27.02
Mental disorders	739	1,111	0.82	1,212	1,062	2,247	2,020	2.72	2.15	-150	-12.35	-227	-10.12	-0.58	-21.21
Total	4,146	1,432	5.94	6,224	5,156	3,531	3,175	19.16	13.80	-1,068	-17.16	-356	-10.09	-5.36	-27.97

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	7.16	1.40	1.15	23.71	14.10	0.101	0.083	2.29	1.49	27.51	16.82	-10.69	-38.87
Breast cancer	0.79	0.15	0.13	2.50	1.58	0.011	0.009	0.24	0.17	2.90	1.89	-1.01	-34.84
Colon cancer	0.61	0.11	0.09	1.78	1.06	0.008	0.006	0.17	0.11	2.06	1.26	-0.80	-38.80
Lung cancer	0.90	0.14	0.12	2.43	1.43	0.010	0.008	0.23	0.15	2.81	1.70	-1.11	-39.41
Prostate cancer	0.59	0.12	0.10	2.10	1.19	0.009	0.007	0.20	0.13	2.44	1.42	-1.02	-41.66
Other cancers	4.27	0.88	0.72	14.91	8.83	0.064	0.052	1.44	0.93	17.30	10.54	-6.76	-39.07
Diabetes	2.54	0.84	0.73	6.88	5.39	0.067	0.058	0.73	0.57	8.52	6.75	-1.77	-20.76
Heart disease	2.32	1.53	1.00	5.57	3.05	0.151	0.098	0.54	0.29	7.79	4.44	-3.35	-43.01
Asthma	2.70	1.64	1.41	5.83	4.74	0.119	0.102	0.57	0.46	8.15	6.71	-1.45	-17.74
Hypertension	6.78	3.09	2.51	16.05	12.69	0.304	0.247	1.56	1.23	21.00	16.68	-4.32	-20.55
Stroke	0.55	0.28	0.23	1.22	0.93	0.020	0.016	0.12	0.09	1.65	1.26	-0.38	-23.35
Emotional disturbances	4.16	1.63	1.43	11.87	9.98	0.118	0.104	1.14	0.96	14.76	12.47	-2.29	-15.54
Total	26.21	10.42	8.46	71.14	50.87	0.88	0.71	6.95	5.09	89.38	65.13	-24.25	-27.13

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	12.30	33.13	38.54	41.05	2.51	6.50	46.82	54.95	8.13	17.36
Capital stock (US$ Billions)	141.95	531.67	1154.14	1196.18	42.05	3.64	3816.57	4187.71	371.15	9.72
Life expectancy at 65 (years)	14.71	18.05	19.74	20.88	1.14	5.75	22.57	24.75	2.18	9.64
GDP* by state (US$ Billions)	47.30	304.50	518.91	555.52	36.61	7.05	970.89	1141.51	170.63	17.57

*Based on Real GDP

Washington

	Direct Costs														
	2003			2023											
				Projections - Level						Projections - Difference					
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)	
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent
Cancer	222	4,407	0.98	390	321	8,884	7,973	3.47	2.56	-69	-17.78	-911	-10.25	-0.91	-26.21
Breast cancer	23	4,916	0.11	40	35	9,919	8,893	0.39	0.31	-5	-12.30	-1,026	-10.34	-0.08	-21.37
Colon cancer	8	11,646	0.09	11	9	25,876	23,212	0.28	0.21	-2	-17.67	-2,663	-10.29	-0.07	-26.14
Lung cancer	9	17,207	0.16	13	11	34,810	31,211	0.46	0.34	-2	-18.44	-3,599	-10.34	-0.12	-26.88
Prostate cancer	20	4,010	0.08	39	31	8,293	7,436	0.32	0.23	-8	-21.48	-856	-10.33	-0.10	-29.59
Other cancers	163	3,344	0.54	288	236	6,987	6,266	2.01	1.48	-52	-18.00	-721	-10.32	-0.53	-26.47
Diabetes	249	2,041	0.51	418	362	4,231	3,794	1.77	1.37	-56	-13.30	-437	-10.33	-0.39	-22.25
Heart disease	302	3,467	1.05	487	319	7,642	6,855	3.72	2.18	-169	-34.63	-787	-10.30	-1.54	-41.36
Pulmonary conditions	993	891	0.88	1,390	1,195	1,913	1,716	2.66	2.05	-195	-14.05	-197	-10.31	-0.61	-22.91
Hypertension	644	917	0.59	962	782	1,905	1,708	1.83	1.34	-180	-18.70	-197	-10.33	-0.50	-27.09
Stroke	49	5,797	0.28	73	59	13,032	11,692	0.95	0.69	-14	-18.84	-1,341	-10.29	-0.26	-27.19
Mental disorders	307	1,820	0.57	511	448	3,741	3,354	1.91	1.50	-63	-12.35	-386	-10.33	-0.41	-21.40
Total	2,767	1,756	4.86	4,231	3,485	4,446	3,988	16.31	11.69	-746	-17.62	-458	-10.30	-4.61	-28.29

	Indirect Impacts* (US$ Billions)												
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	5.70	1.11	0.91	18.78	11.17	0.080	0.065	1.82	1.18	21.78	13.32	-8.46	-38.86
Breast cancer	0.65	0.13	0.11	2.12	1.35	0.009	0.008	0.21	0.14	2.46	1.61	-0.86	-34.84
Colon cancer	0.51	0.09	0.07	1.52	0.91	0.006	0.005	0.15	0.10	1.76	1.08	-0.68	-38.80
Lung cancer	0.91	0.15	0.12	2.50	1.47	0.011	0.009	0.24	0.16	2.90	1.76	-1.14	-39.41
Prostate cancer	0.47	0.10	0.08	1.75	0.99	0.007	0.006	0.17	0.10	2.03	1.18	-0.84	-41.66
Other cancers	3.15	0.64	0.52	10.89	6.45	0.046	0.038	1.05	0.68	12.63	7.70	-4.93	-39.07
Diabetes	1.90	0.69	0.60	5.62	4.41	0.055	0.047	0.60	0.47	6.96	5.52	-1.45	-20.76
Heart disease	1.65	1.13	0.74	4.11	2.25	0.111	0.073	0.40	0.22	5.75	3.28	-2.47	-43.01
Asthma	1.89	1.15	0.99	4.09	3.32	0.083	0.072	0.40	0.32	5.71	4.70	-1.01	-17.74
Hypertension	4.89	2.32	1.89	12.06	9.54	0.228	0.186	1.17	0.92	15.78	12.54	-3.24	-20.55
Stroke	0.45	0.24	0.20	1.06	0.80	0.018	0.014	0.10	0.08	1.42	1.09	-0.33	-23.35
Emotional disturbances	1.73	0.69	0.60	5.01	4.21	0.050	0.044	0.48	0.40	6.23	5.26	-0.97	-15.54
Total	18.22	7.33	5.92	50.72	35.69	0.63	0.50	4.96	3.59	63.64	45.70	-17.94	-28.19

* Based on Nominal GDP

	Intergenerational Impacts									
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	12.70	28.00	33.03	35.19	2.16	6.53	41.15	48.29	7.14	17.34
Capital stock (US$ Billions)	138.10	481.20	1045.09	1083.30	38.21	3.64	4080.93	4477.37	396.44	9.72
Life expectancy at 65 (years)	15.26	18.84	20.60	21.79	1.19	5.77	23.56	25.83	2.27	9.63
GDP* by state (US$ Billions)	35.05	246.15	431.94	462.52	30.58	7.08	983.40	1156.04	172.64	17.56

*Based on Real GDP

West Virginia

Direct Costs																
	2003			2023												
				Projections - Level						Projections - Difference						
	PRC (Thousands)	Expenditure per PRC ($)	Total Expenditure (US$ Billions)	PRC (Thousands)		Expenditure per PRC ($)		Total Expenditure (US$ Billions)		PRC (Thousands)		Expenditure per PRC ($)		Avoidable Costs (US$ Billions)		
Chronic Disease				Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent	Absolute	Percent	Absolute	Percent	
Cancer	72	4,718	0.34	104	85	8,639	7,871	0.90	0.67	-19	-17.87	-768	-8.89	-0.23	-25.17	
Breast cancer	7	4,634	0.03	8	7	8,447	7,693	0.07	0.06	-1	-12.30	-755	-8.93	-0.01	-20.13	
Colon cancer	3	13,299	0.04	3	2	26,335	23,991	0.08	0.06	-1	-17.67	-2,343	-8.90	-0.02	-24.99	
Lung cancer	3	18,304	0.05	3	3	33,446	30,458	0.11	0.08	-1	-18.44	-2,987	-8.93	-0.03	-25.73	
Prostate cancer	6	3,774	0.02	10	8	7,027	6,400	0.07	0.05	-2	-21.48	-627	-8.92	-0.02	-28.49	
Other cancers	54	3,819	0.20	79	65	7,174	6,534	0.57	0.43	-14	-18.00	-640	-8.92	-0.14	-25.32	
Diabetes	111	2,065	0.23	150	130	3,853	3,509	0.58	0.46	-20	-13.30	-344	-8.92	-0.12	-21.03	
Heart disease	178	3,756	0.66	222	145	7,387	6,729	1.64	0.98	-77	-34.63	-657	-8.90	-0.66	-40.44	
Pulmonary conditions	371	973	0.36	446	383	1,872	1,705	0.84	0.65	-63	-14.05	-167	-8.91	-0.18	-21.71	
Hypertension	301	1,014	0.30	357	290	1,895	1,726	0.68	0.50	-67	-18.70	-169	-8.92	-0.18	-25.95	
Stroke	20	6,783	0.14	22	18	13,569	12,362	0.30	0.23	-4	-18.84	-1,207	-8.89	-0.08	-26.06	
Mental disorders	225	1,327	0.30	290	254	2,457	2,238	0.71	0.57	-36	-12.35	-219	-8.93	-0.14	-20.17	
Total	1,278	1,828	2.34	1,591	1,306	3,997	3,641	5.64	4.05	-285	-17.90	-356	-8.91	-1.59	-28.18	

Indirect Impacts* (US$ Billions)													
	2003	2023											
	Total	Individual				Caregiver				Total			
		Lost Work Days		Presenteeism		Lost Work Days		Presenteeism		Projections - Level		Projections - Difference	
Chronic Disease	Level	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Baseline	Optimistic	Absolute	Percent
Cancer	1.85	0.30	0.24	5.01	2.97	0.021	0.017	0.48	0.31	5.81	3.55	-2.26	-38.93
Breast cancer	0.16	0.02	0.02	0.40	0.25	0.002	0.001	0.04	0.03	0.46	0.30	-0.16	-34.81
Colon cancer	0.19	0.03	0.02	0.44	0.26	0.002	0.002	0.04	0.03	0.51	0.31	-0.20	-38.78
Lung cancer	0.28	0.04	0.03	0.61	0.36	0.003	0.002	0.06	0.04	0.70	0.43	-0.28	-39.38
Prostate cancer	0.13	0.02	0.02	0.39	0.22	0.002	0.001	0.04	0.02	0.45	0.26	-0.19	-41.63
Other cancers	1.09	0.19	0.15	3.17	1.88	0.014	0.011	0.31	0.20	3.68	2.24	-1.44	-39.05
Diabetes	0.85	0.25	0.21	2.02	1.59	0.020	0.017	0.22	0.17	2.50	1.98	-0.52	-20.76
Heart disease	0.97	0.51	0.34	1.87	1.02	0.051	0.033	0.18	0.10	2.62	1.49	-1.13	-43.01
Asthma	0.71	0.37	0.32	1.31	1.06	0.027	0.023	0.13	0.10	1.83	1.51	-0.33	-17.74
Hypertension	2.29	0.86	0.70	4.47	3.54	0.085	0.069	0.43	0.34	5.85	4.65	-1.20	-20.55
Stroke	0.18	0.08	0.06	0.33	0.25	0.005	0.004	0.03	0.02	0.44	0.34	-0.10	-23.35
Emotional disturbances	1.27	0.39	0.34	2.84	2.38	0.028	0.025	0.27	0.23	3.53	2.98	-0.55	-15.54
Total	8.12	2.75	2.21	17.85	12.82	0.24	0.19	1.75	1.28	22.58	16.50	-6.09	-26.95

* Based on Nominal GDP

Intergenerational Impacts										
			2023		2023		2050		2050	
			Projections - Level		Projections - Difference		Projections - Level		Projections - Difference	
Variables	1970	2003	Baseline	Optimistic	Absolute	Percent	Baseline	Optimistic	Absolute	Percent
Bachelor's degrees (percent)	6.80	15.67	17.66	18.81	1.15	6.52	22.79	26.75	3.96	17.38
Capital stock (US$ Billions)	51.12	206.38	332.78	344.93	12.15	3.64	730.74	801.87	71.14	9.72
Life expectancy at 65 (years)	14.46	16.90	18.48	19.55	1.07	5.77	21.13	23.17	2.04	9.65
GDP* by state (US$ Billions)	9.73	42.94	69.98	74.92	4.95	7.07	92.20	108.42	16.22	17.59

*Based on Real GDP

Wisconsin

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level PRC (Thousands) Baseline	Optimistic	Expenditure per PRC ($) Baseline	Optimistic	Total Expenditure (US$ Billions) Baseline	Optimistic	2023 Projections - Difference PRC (Thousands) Absolute	Percent	Expenditure per PRC ($) Absolute	Percent	Avoidable Costs (US$ Billions) Absolute	Percent
Cancer	185	5,315	0.98	287	236	10,647	9,560	3.06	2.26	-51	-17.82	-1,086	-10.21	-0.80	-26.20
Breast cancer	21	5,497	0.11	29	26	11,012	9,884	0.32	0.26	-4	-12.30	-1,128	-10.24	-0.07	-21.28
Colon cancer	5	12,535	0.06	6	5	27,626	24,810	0.17	0.13	-1	-17.67	-2,817	-10.20	-0.05	-26.06
Lung cancer	5	18,154	0.10	7	6	36,464	32,730	0.25	0.18	-1	-18.44	-3,734	-10.24	-0.07	-26.80
Prostate cancer	19	5,002	0.10	33	26	10,268	9,217	0.34	0.24	-7	-21.48	-1,050	-10.23	-0.10	-29.51
Other cancers	135	4,494	0.61	212	174	9,320	8,367	1.98	1.45	-38	-18.00	-953	-10.23	-0.52	-26.39
Diabetes	192	2,248	0.43	286	248	4,626	4,153	1.33	1.03	-38	-13.30	-473	-10.23	-0.29	-22.17
Heart disease	356	4,137	1.47	489	320	9,047	8,124	4.42	2.60	-169	-34.63	-923	-10.20	-1.83	-41.29
Pulmonary conditions	928	1,169	1.09	1,173	1,009	2,492	2,238	2.92	2.26	-165	-14.05	-255	-10.21	-0.67	-22.83
Hypertension	685	882	0.60	917	745	1,819	1,633	1.67	1.22	-171	-18.70	-186	-10.23	-0.45	-27.01
Stroke	53	5,287	0.28	67	54	11,790	10,588	0.78	0.57	-13	-18.84	-1,201	-10.19	-0.21	-27.11
Mental disorders	812	1,697	1.37	1,170	1,025	3,463	3,108	4.05	3.19	-144	-12.35	-354	-10.23	-0.86	-21.32
Total	3,210	1,938	6.22	4,389	3,637	4,701	4,221	18.24	13.12	-752	-17.13	-480	-10.22	-5.12	-28.06

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Optimistic	Individual Presenteeism Baseline	Optimistic	Caregiver Lost Work Days Baseline	Optimistic	Caregiver Presenteeism Baseline	Optimistic	Total Projections - Level Baseline	Optimistic	Total Projections - Difference Absolute	Percent
Cancer	4.75	0.82	0.67	13.83	8.22	0.059	0.048	1.34	0.87	16.05	9.81	-6.24	-38.88
Breast cancer	0.55	0.09	0.08	1.47	0.93	0.006	0.005	0.14	0.10	1.70	1.11	-0.59	-34.81
Colon cancer	0.31	0.05	0.04	0.78	0.47	0.003	0.003	0.08	0.05	0.91	0.56	-0.35	-38.77
Lung cancer	0.48	0.07	0.05	1.13	0.66	0.005	0.004	0.11	0.07	1.31	0.79	-0.51	-39.38
Prostate cancer	0.47	0.09	0.07	1.52	0.86	0.006	0.005	0.15	0.09	1.76	1.03	-0.73	-41.62
Other cancers	2.94	0.53	0.43	8.94	5.30	0.038	0.031	0.86	0.56	10.37	6.32	-4.05	-39.04
Diabetes	1.46	0.47	0.41	3.86	3.02	0.038	0.032	0.41	0.32	4.78	3.79	-0.99	-20.76
Heart disease	1.95	1.13	0.74	4.13	2.26	0.111	0.073	0.40	0.22	5.77	3.29	-2.48	-43.01
Asthma	1.77	0.97	0.83	3.45	2.80	0.070	0.061	0.33	0.27	4.82	3.97	-0.86	-17.74
Hypertension	5.21	2.21	1.80	11.49	9.09	0.217	0.177	1.11	0.88	15.03	11.94	-3.09	-20.55
Stroke	0.48	0.22	0.18	0.97	0.74	0.016	0.013	0.09	0.07	1.31	1.00	-0.31	-23.35
Emotional disturbances	4.57	1.57	1.38	11.46	9.63	0.114	0.100	1.10	0.92	14.25	12.03	-2.21	-15.54
Total	20.19	7.40	6.01	49.18	35.75	0.63	0.50	4.79	3.56	62.00	45.83	-16.18	-26.09

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	Optimistic	2023 Projections - Difference Absolute	Percent	2050 Projections - Level Baseline	Optimistic	2050 Projections - Difference Absolute	Percent
Bachelor's degrees (percent)	9.80	24.57	27.53	29.33	1.80	6.53	34.36	40.34	5.98	17.40
Capital stock (US$ Billions)	135.92	398.27	797.56	826.72	29.17	3.64	2209.32	2424.72	215.40	9.72
Life expectancy at 65 (years)	15.32	18.95	20.72	21.92	1.20	5.77	23.69	25.98	2.29	9.66
GDP* by state (US$ Billions)	35.91	191.81	288.88	309.34	20.46	7.08	482.75	567.81	85.06	17.62

*Based on Real GDP

Wyoming

Direct Costs

Chronic Disease	2003 PRC (Thousands)	2003 Expenditure per PRC ($)	2003 Total Expenditure (US$ Billions)	2023 Projections - Level: PRC (Thousands) Baseline	PRC (Thousands) Optimistic	Expenditure per PRC ($) Baseline	Expenditure per PRC ($) Optimistic	Total Expenditure (US$ Billions) Baseline	Total Expenditure (US$ Billions) Optimistic	2023 Projections - Difference: PRC (Thousands) Absolute	PRC (Thousands) Percent	Expenditure per PRC ($) Absolute	Expenditure per PRC ($) Percent	Avoidable Costs (US$ Billions) Absolute	Avoidable Costs (US$ Billions) Percent
Cancer	17	3,827	0.07	27	22	8,579	7,619	0.23	0.17	-5	-17.90	-960	-11.19	-0.06	-27.09
Breast cancer	1	4,021	0.01	3	2	8,673	7,697	0.02	0.02	0	-12.30	-976	-11.25	0.00	-22.16
Colon cancer	1	10,973	0.01	1	1	26,295	23,352	0.03	0.02	0	-17.67	-2,943	-11.19	-0.01	-26.88
Lung cancer	1	14,583	0.01	1	1	31,543	27,995	0.03	0.02	0	-18.44	-3,548	-11.25	-0.01	-27.62
Prostate cancer	2	3,441	0.01	3	3	7,624	6,767	0.03	0.02	-1	-21.48	-857	-11.24	-0.01	-30.30
Other cancers	12	2,904	0.04	19	16	6,507	5,776	0.13	0.09	-3	-18.00	-731	-11.23	-0.03	-27.21
Diabetes	18	1,814	0.03	32	28	4,030	3,577	0.13	0.10	-4	-13.30	-453	-11.23	-0.03	-23.04
Heart disease	26	3,272	0.09	49	32	7,772	6,902	0.38	0.22	-17	-34.63	-870	-11.20	-0.16	-41.95
Pulmonary conditions	67	822	0.05	80	69	1,899	1,686	0.15	0.12	-11	-14.05	-213	-11.21	-0.04	-23.69
Hypertension	53	812	0.04	73	60	1,808	1,605	0.13	0.10	-14	-18.70	-203	-11.23	-0.04	-27.83
Stroke	3	5,637	0.02	5	4	13,684	12,153	0.07	0.05	-1	-18.84	-1,531	-11.19	-0.02	-27.92
Mental disorders	51	1,588	0.08	75	66	3,493	3,101	0.26	0.20	-9	-12.35	-393	-11.24	-0.06	-22.20
Total	235	1,637	0.39	342	280	4,349	3,861	1.36	0.96	-61	-17.92	-488	-11.22	-0.40	-29.63

Indirect Impacts* (US$ Billions)

Chronic Disease	2003 Total Level	2023 Individual Lost Work Days Baseline	Individual Lost Work Days Optimistic	Individual Presenteeism Baseline	Individual Presenteeism Optimistic	Caregiver Lost Work Days Baseline	Caregiver Lost Work Days Optimistic	Caregiver Presenteeism Baseline	Caregiver Presenteeism Optimistic	Total Projections - Level Baseline	Total Projections - Level Optimistic	Total Projections - Difference Absolute	Total Projections - Difference Percent
Cancer	0.44	0.08	0.06	1.31	0.78	0.0056	0.0046	0.13	0.08	1.52	0.93	-0.59	-38.95
Breast cancer	0.04	0.01	0.01	0.12	0.08	0.0005	0.0005	0.01	0.01	0.14	0.09	-0.05	-34.82
Colon cancer	0.06	0.01	0.01	0.16	0.09	0.0007	0.0006	0.02	0.01	0.18	0.11	-0.07	-38.78
Lung cancer	0.08	0.01	0.01	0.18	0.11	0.0008	0.0006	0.02	0.01	0.21	0.13	-0.08	-39.39
Prostate cancer	0.04	0.01	0.01	0.15	0.08	0.0006	0.0005	0.01	0.01	0.17	0.10	-0.07	-41.64
Other cancers	0.23	0.04	0.03	0.70	0.42	0.0030	0.0024	0.07	0.04	0.81	0.50	-0.32	-39.05
Diabetes	0.14	0.05	0.05	0.43	0.34	0.0042	0.0036	0.05	0.04	0.53	0.42	-0.11	-20.76
Heart disease	0.14	0.11	0.07	0.41	0.22	0.0111	0.0072	0.04	0.02	0.57	0.33	-0.25	-43.01
Asthma	0.13	0.07	0.06	0.24	0.19	0.0048	0.0041	0.02	0.02	0.33	0.27	-0.06	-17.74
Hypertension	0.40	0.18	0.14	0.92	0.73	0.0174	0.0141	0.09	0.07	1.20	0.95	-0.25	-20.55
Stroke	0.03	0.02	0.01	0.08	0.06	0.0013	0.0010	0.01	0.01	0.10	0.08	-0.02	-23.35
Emotional disturbances	0.29	0.10	0.09	0.74	0.62	0.0074	0.0064	0.07	0.06	0.92	0.77	-0.14	-15.54
Total	1.57	0.60	0.49	4.12	2.93	0.05	0.04	0.40	0.29	5.18	3.76	-1.42	-27.47

* Based on Nominal GDP

Intergenerational Impacts

Variables	1970	2003	2023 Projections - Level Baseline	2023 Projections - Level Optimistic	2023 Projections - Difference Absolute	2023 Projections - Difference Percent	2050 Projections - Level Baseline	2050 Projections - Level Optimistic	2050 Projections - Difference Absolute	2050 Projections - Difference Percent
Bachelor's degrees (percent)	11.80	19.83	24.34	25.93	1.59	6.51	31.50	36.96	5.46	17.34
Capital stock (US$ Billions)	13.09	63.84	109.03	113.01	3.98	3.64	271.20	297.55	26.34	9.72
Life expectancy at 65 (years)	15.30	18.28	19.99	21.14	1.15	5.76	22.86	25.06	2.20	9.63
GDP* by state (US$ Billions)	2.84	20.11	32.56	34.86	2.30	7.06	52.23	61.40	9.17	17.55

*Based on Real GDP

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