THE ECONOMIC COSTS OF OVERWEIGHT, OBESITY, AND PHYSICAL INACTIVITY AMONG CALIFORNIA ADULTS — 2006

A study for the California Center for Public Health Advocacy

Conducted by Chenoweth & Associates, Inc.
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EXECUTIVE SUMMARY

Overweight, obesity, and physical inactivity are major risk factors for health conditions related to premature illness, disability, and death, and contribute significantly to the nation's rising medical care costs. In California in 2006, nearly 60% of adults were overweight or obese and almost half of California adults did not meet the recommended level and intensity of daily physical activity.

The California Center for Public Health Advocacy commissioned Chenoweth & Associates, Inc. to estimate the economic costs of overweight, obesity, and physical inactivity in the state of California and its counties. The results are based on an assessment of both health care costs and costs associated with lost productivity. The study also determined projected costs for overweight, obesity, and physical inactivity through 2011.

This study estimated the cost to California for overweight, obesity, and physical inactivity in 2006 to be $41.2 billion. Of the total costs, $21.0 billion was attributable to overweight and obesity and $20.2 billion was attributable to physical inactivity. Half of the total amount was spent on health care and half came from lost productivity. If this trend continues, total costs for the state will increase to $52.7 billion in 2011. Among California's counties, Los Angeles County, with its large population, accounted for more than one-quarter of all costs, followed by Orange and San Diego counties.

If the state of California is able to achieve a modest reduction in the prevalence of overweight, obesity, and physical inactivity of just 5% per year for each of these risk factors, the savings realized would average nearly $2.4 billion per year.

Because employers and taxpayers share much of the burden of the economic costs associated with overweight, obesity, and physical inactivity, both the public and private sectors would benefit from the development and implementation of strategies that promote healthy eating and physical activity.

The estimated cost to California for overweight, obesity, and physical inactivity in 2006 was $41.2 billion. If this trend continues, total costs for the state will increase to more than $52.7 billion in 2011.

DEFINITIONS

Overweight:
Body mass index of 25.0 – 29.9

Obesity:
Body mass index of 30.0 or above

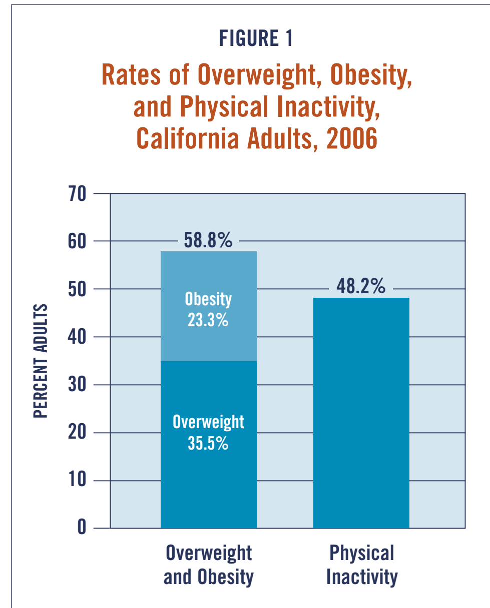
Physical Inactivity:
Engaging in less than 30 minutes of moderate physical activity on most days

SOURCE: Centers for Disease Control & Prevention

BACKGROUND

Overweight, obesity, and physical inactivity are major risk factors for many health conditions related to premature illness, disability, and death — among them, coronary heart disease, type 2 diabetes, some forms of cancer, and stroke[1–4] — and contribute significantly to the nation's rising medical care costs.[5–12]

In 2006, the Centers for Disease Control and Prevention (CDC) reported that a total of 58.8% of California adults were overweight or obese (35.5% and 23.3%, respectively).[13] The two most recent CDC surveys reported a statewide adult physical inactivity rate for California of 46.6% in 2005 and 49.8% in 2007.[14] A median prevalence rate of 48.2% was used in this study to estimate an approximate level of physical inactivity in 2006 (see Figure 1).



Overweight, obesity, and physical inactivity are major risk factors for many health conditions related to premature illness, disability, and death.

PURPOSE OF THE STUDY

The purpose of the study was to determine the current and future economic impact of overweight, obesity, and physical inactivity in the state of California. The last time such a study was published was in 2005 based on data for the year 2000.[15] The current study also provides findings for California's counties. Economic costs at the county level were intended to allow local policy makers, business and community leaders, and community residents to know the economic effect of these three conditions in their geographic areas.

Specifically, the study sought to determine the following:

- Total medical care and prescription drug costs of medical conditions related to overweight, obesity, and physical inactivity for the state of California and its counties
- Lost productivity costs for each risk factor at the state and county level
- Future cost projections for each risk factor, assuming current prevalence and inflationary trends continue
- Projected cost savings for the state if even 5% of California adults who are currently overweight, obese, and/or physically inactive reduced their body weight or increased their physical activity to the recommended levels

METHODOLOGY

A statewide econometric analysis of costs related to overweight, obesity, and physical inactivity was conducted for California and its counties using health care and productivity data from several California and national databases. Health care cost estimates for each risk factor include direct medical care and prescription drug costs; lost productivity costs for each risk factor include costs associated with absenteeism, short term disability, and presenteeism (defined as the portion of an employee's work load they are unable to do because of their compromised health status). The aggregate cost of each of the three risk factors was calculated for each county and the entire state. Finally, medical care/prescription drug costs and lost productivity costs were projected for future years to estimate how these costs would change if the prevalence rates for the three risk factors continued at the current pace and what cost savings could be achieved if those risk factors were reduced even minimally.

Cost estimates assigned to each of the selected risk factors were based on conservative estimates of underlying factors. Thus, findings are likely to be conservative estimates as well. The Appendix provides a detailed description of the study methodology and limitations.

Overweight, obesity, and physical inactivity have profound health and economic consequences.

FINDINGS

Health Care and Lost Productivity Costs

TABLE 1

Health Care and Lost Productivity Costs from Overweight, Obesity, and Physical Inactivity, California, 2006

	Overweight & Obesity	Physical Inactivity	TOTALS
Health Care Costs	$12.8 billion	$7.9 billion	**$20.7 billion**
Lost Productivity Costs	$8.2 billion	$12.3 billion	**$20.4 billion**
TOTALS	**$21.0 billion**	**$20.2 billion**	**$41.2 billion***

Figures may not add to total due to rounding.

The total estimated cost to California for overweight, obesity, and physical inactivity in 2006 was $41.2 billion. Of the total costs, $21.0 billion was attributable to overweight and obesity, and $20.2 billion was attributable to physical inactivity. Half of the total amount was spent on health care (medical care and prescription drugs) and half came from lost productivity (see Table 1). Conditions stemming from overweight and obesity contributed $12.8 billion (62%) to health care costs, while those related to physical inactivity accounted for $7.9 billion (38%). Total lost productivity costs associated with overweight, obesity, and physical inactivity in California in 2006 were $20.4 billion, including $8.2 billion related to overweight and obesity (40%) and $12.3 billion related to physical inactivity (60%) (see Figure 2).

Table 2 (on next page) presents the costs of health care and lost productivity for the three risk factors by county and for the state as a whole. Due to the size of their populations, Los Angeles, Orange, and San Diego counties accounted for nearly half of the state's total costs.

FIGURE 2: **Percentage of Costs to California for Overweight, Obesity, and Physical Inactivity, 2006**

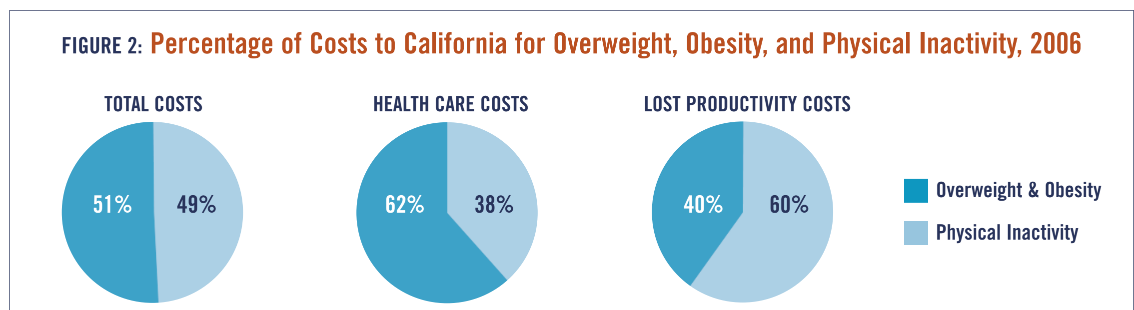


TABLE 2

Economic Costs Associated with Overweight, Obesity, and Physical Inactivity in California Counties,* 2006

COUNTY	OVERWEIGHT & OBESITY		PHYSICAL INACTIVITY		TOTAL
	HEALTH CARE	LOST PRODUCTIVITY	HEALTH CARE	LOST PRODUCTIVITY	
Alameda	$1,022,493,320	$370,977,757	$189,635,029	$595,643,405	$2,178,749,511
Butte	$101,396,770	$32,399,599	$65,758,445	$43,463,232	$243,018,045
Contra Costa	$404,221,810	$272,232,863	$255,603,709	$386,509,777	$1,318,568,159
El Dorado	$59,641,096	$31,626,939	$39,983,414	$44,781,471	$176,032,920
Fresno	$267,397,527	$181,083,857	$149,737,716	$216,618,388	$814,837,488
Humboldt	$40,700,227	$19,822,518	$26,035,970	$25,055,640	$111,614,355
Imperial	$56,344,348	$27,113,157	$31,538,647	$29,852,954	$144,849,106
Kern	$281,023,090	$153,339,517	$172,825,417	$199,394,032	$806,582,056
Kings	$42,523,486	$28,055,537	$25,821,065	$32,069,645	$128,469,732
Lake	$36,298,603	$9,101,561	$21,502,216	$11,119,542	$78,021,922
Los Angeles	$3,601,500,613	$2,380,889,464	$2,389,631,908	$3,509,485,298	$11,881,507,282
Madera	$35,757,909	$26,745,791	$21,813,037	$32,062,484	$116,379,222
Marin	$55,823,745	$43,404,436	$48,414,014	$82,121,072	$229,763,267
Mendocino	$9,041,988	$14,673,312	$5,164,952	$18,172,965	$47,053,217
Merced	$122,833,747	$47,636,058	$64,206,122	$52,823,237	$287,499,163
Monterey	$186,716,905	$110,934,183	$109,920,445	$126,813,230	$534,384,763
Napa	$63,033,157	$29,541,415	$42,867,363	$42,794,998	$178,236,933
Nevada	$55,814,482	$13,826,790	$48,269,253	$22,146,490	$140,057,014
Orange	$776,396,969	$691,959,910	$586,129,199	$1,219,456,431	$3,273,942,509
Placer	$81,770,064	$64,181,888	$56,055,632	$97,173,505	$299,181,088
Riverside	$443,401,567	$345,544,640	$370,674,371	$459,833,591	$1,619,454,168
Sacramento	$558,107,329	$363,575,032	$301,772,622	$437,819,850	$1,661,274,834
San Bernardino	$371,988,689	$401,747,270	$192,254,829	$524,830,196	$1,490,820,984
San Diego	$817,945,377	$647,077,040	$577,254,569	$999,779,198	$3,042,056,184
San Francisco	$244,703,445	$193,072,957	$225,528,252	$423,071,502	$1,086,376,156
San Joaquin	$357,643,950	$129,502,359	$191,599,880	$161,820,055	$840,566,243
San Luis Obispo	$179,805,931	$44,329,042	$168,087,338	$61,456,910	$453,679,220
San Mateo	$351,116,006	$216,493,810	$223,291,405	$361,466,707	$1,152,367,927
Santa Barbara	$133,523,535	$89,644,429	$82,771,771	$128,916,568	$434,856,303
Santa Clara	$420,089,065	$496,770,143	$227,377,058	$911,184,787	$2,055,421,054
Santa Cruz	$116,932,507	$48,507,742	$78,952,361	$72,688,675	$317,081,285
Shasta	$111,090,845	$30,900,455	$69,350,965	$41,393,440	$252,735,705
Solano	$158,429,455	$97,507,493	$97,239,872	$129,336,401	$482,513,221
Sonoma	$114,668,973	$84,373,927	$90,816,010	$146,866,048	$436,724,958
Stanislaus	$362,487,458	$111,753,779	$208,431,543	$128,436,390	$811,109,170
Sutter	$32,084,565	$14,578,464	$19,343,231	$17,654,708	$83,660,969
Tulare	$143,835,345	$50,338,408	$86,403,564	$62,434,963	$343,012,280
Ventura	$287,718,588	$154,743,132	$204,090,472	$222,866,813	$869,419,005
Yolo	$58,250,081	$40,487,741	$41,322,192	$57,404,447	$197,464,460
STATEWIDE	**$12,789,271,376**	**$8,198,210,169**	**$7,948,454,479**	**$12,250,512,800**	**$41,186,448,824**

** Results for counties with populations less than 50,000 (Alpine, Amador, Calaveras, Colusa, Del Norte, Glenn, Inyo, Lassen, Mariposa, Modoc, Mono, Plumas, San Benito, Sierra, Siskiyou, Tehama, Trinity, Tuolumne, and Yuba) are not included in the table because county-specific risk factor data were not available. Costs from these counties were included in the statewide total.*

Projected Costs and Potential Cost Savings

The final phase of this analysis focused on the projected costs of overweight, obesity, and physical inactivity from 2007 through 2011 and the potential cost savings that could be achieved if the prevalence rates of these risk factors could be reduced.

Even if the prevalence rates remained constant, over time the economic costs associated with these risk factors would rise because of population growth and increased health care and employment costs.

Specifically, if California's population continues to rise at an expected rate of about 1% per year, medical care and prescription drug costs continue to rise at least 6% per year, and employment costs continue to rise at least 3% per year, then the combined health care and lost productivity costs associated with the three risk factors are conservatively estimated to increase to $52.7 billion in 2011, or a cumulative five-year increase of 28% (see Figure 3).

If, however, the state of California is able to achieve a modest reduction in the prevalence of overweight, obesity, and physical inactivity of just 5% per year for each risk factor, the savings realized would average nearly $2.4 billion per year.

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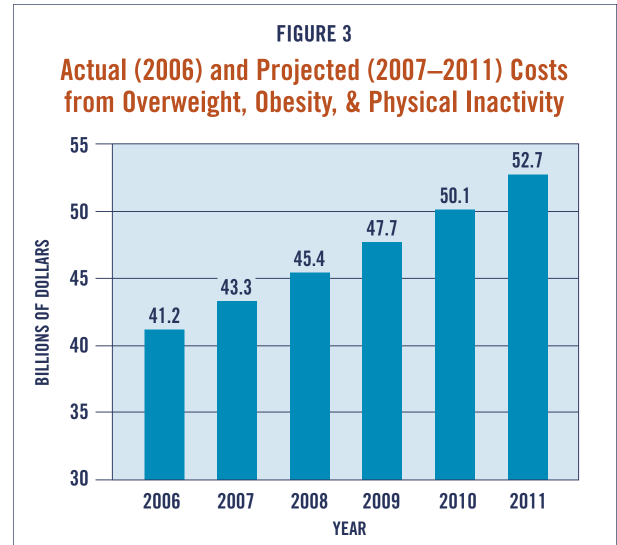

DISCUSSION

Overweight, obesity, and physical inactivity have profound health consequences for the people of California. This analysis shows that the three risk factors — individually and collectively — also have profound economic consequences. California businesses, the backbone of the state's economy, are particularly affected. Because employers pay much of the cost of health care benefits, steady increases in health insurance premiums, in part due to increasing illness caused by poor diet and lack of physical activity, affect their bottom line, as does lost productivity resulting from these risk factors and their resulting illnesses. Taxpayers, too, have a huge financial stake in reversing these public health liabilities, as they pay for resulting illnesses through Medi-Cal and Medicare.

In order to reduce the unacceptably high prevalence of overweight, obesity, and physical inactivity, along with the costly and preventable illnesses associated with them, both the public and private sectors would benefit from promoting healthy eating and physical activity. While Californians must be encouraged to improve their individual behaviors, public policies must also be established to make it easier for Californians to adopt healthier lifestyles.

APPENDIX

Study Methodology

This econometric evaluation of costs related to overweight, obesity, and physical inactivity for California and its counties used available medical care and productivity data sources obtained from several California and national databases (see Table A-1).

TABLE A-1: Data Framework for the Study

Dollar year	Year 2006 dollars
Population	Statewide and 58 counties
Risk factors included	Overweight, obesity, and physical inactivity
Medical conditions included	Circulatory, digestive, injury, mental, metabolic, musculo-skeletal, neoplasm, nervous, pregnancy complications, and signs/symptoms ill-defined
State-level risk factor prevalence rates	Self-reported height and weight from the 2006 California Behavioral Risk Factor Surveillance Surveys (BRFSS); physical inactivity rates from the 2005 and 2007 BRFSS
County-level risk factor prevalence rates	Self-reported height and weight reported in the 2005 California Health Interview Survey (CHIS); self-reported physical inactivity rates reported in the 2001 California Health Interview Survey (CHIS)
Data source for inpatient medical costs: employer and private pay	2006 claims data from California's Office of Statewide Health Planning and Development (OSHPD) for 2006 by patient county residence and Diagnosis Related Group (DRG)
Data source for outpatient medical costs: employer and private pay	Estimated 2006 California corporate medical claims data (based on 2000 data from the authors) and 2006 claims data from OSHPD for ambulatory surgery and emergency department by patient county residence and Diagnosis Related Group (DRG)
Data source for outpatient medical costs: public pay (Medi-Cal)	Claims data from Medi-Cal for enrolled adults for the period of January 1, 2004 to December 31, 2004, projected to 2006 dollar values
Data source for prescription drug costs	Year 2006 cost norms from the 2007 Express Scripts Drug Trend Report and California prescription drug retail sales data from The Henry J. Kaiser Family Foundation
Lost productivity	Official Disability Guidelines injury frequency norms, 23 published studies, and California Employment Development Division average annual worker earnings

Overweight, Obesity, and Physical Inactivity Prevalence Rates

In order to estimate 2006 overweight and obesity prevalence rates, 2005 California Health Interview Survey (CHIS) results for height and weight for California counties were statistically adjusted to make them consistent with statewide-level Behavioral Risk Factor Surveillance Survey (BRFSS) findings for 2006.

The physical inactivity rates used in this study were based on the most recent available state and national health survey data. Because BRFSS did not collect physical inactivity prevalence rates in 2006, this study used the median between the statewide rates reported by BRFSS in 2005 and 2007. Because 2005 CHIS did not determine what proportion of Californians engage in less than 30 minutes of moderate physical activity on most days, this study utilized 2001 county-level CHIS

physical inactivity rates and statistically adjusted them to make them consistent with the estimated 2006 state-level physical inactivity rates from BRFSS.

Health Care Costs: Medical Care

Medical care costs were determined using health care claims data for California adults for medical conditions that have been shown in the published scientific literature as being directly linked to overweight, obesity, and physical inactivity. These conditions are represented by more than 100 diagnosis-related groups (DRGs) within the following ten major diagnostic categories: circulatory, digestive, injury, mental, metabolic, musculoskeletal and nervous conditions, some cancers, some pregnancy complications, and other signs and symptoms of an ill-defined nature (see Table A-2).

TABLE A-2

Medical Conditions Associated with Targeted Risk Factors—Diagnosis-Related Groups

Circulatory
(DRGs: 014-017, 103-112, 120-145)
Cardiovascular disease
Myocardial infarction
Hypertension
Deep vein thrombosis
Chronic venous insufficiency
Stroke
Atherosclerosis
Coronary atherosclerosis
Angina pectoris
Congestive heart failure

Digestive
(DRGs: 179, 193-198, 203-204, 207-208, 316-317)
Gallbladder disease
Liver disease
End stage renal disease
Acute/chronic pancreatitis

Injury
(DRGs: 418, 452-453)
Infection following wounds
Heat disorders
Surgical complications
Hip fracture

Mental
(DRGs: 426-427)
Neurotic depression*
Depressive disorder
Anxiety states
** Excludes brief depressive reactive and prolonged depressive reaction*

Metab/Endo/Nutrition
(DRGs: 294-295, 488-490)
Diabetes
Gout
Impaired immune response

Musculo-Skeletal
(DRGs: 237, 241-246, 243, 248)
Osteoarthritis knee or hip
Rheumatoid arthritis
Low back pain
Low back strain/sprain
Tendon/myo/bursitis
Pain in joint
Stiffness in joint
Polymyalgia/rheum.
Osteoporosis

Neoplasms (Cancers)
(DRGs: 148-149, 152, 154-156, 203, 290, 274-275, 306-307, 318-319, 354-359, 401-404)
Esophageal/gastric
Colorectal
Breast
Endometrial
Bladder
Renal (kidney)
Lymphoma
Carcinoma *in situ*
Prostate

Nervous
(DRG: 6)
Carpal tunnel syndrome

Pregnancy
(DRGs: 354, 358, 366, 368, 370, 372, 390)
Obstetric & gynecol. complications

Signs/Symptoms Ill-Defined
(DRGs: 87-88)
Impaired respiratory function
Sleep apnea
Urinary stress incontinence

As the first step toward estimating the direct medical care costs of each risk factor in relation to the targeted conditions, medical care claims utilization and cost data were obtained on as many California adults as possible for 2006 on a county-by-county basis. The California Office of State Health Planning and Development (OSHPD), the organization charged with acquiring, tracking, and managing all inpatient encounters, provided the inpatient claims data for the selected medical conditions.

Although no centralized database on outpatient claims for California is available, OSPHD tracks outpatient ambulatory surgery (AS) and emergency department (ED) encounters. These claims data were obtained for 2006. Because financial charge and payment data are not provided on either AS or ED encounters, an in-house California corporate medical claims database compiled by the authors was used. This database includes medical encounters and costs from numerous medical claims data

analyses that the authors performed for several California employers in the late 1990s. Because those employers are located in northern, central, and southern California, they provide a representative sample of health care utilization and cost patterns throughout the state. That database provided per-encounter payment norms (which were adjusted to year 2006 cost values) for AS and ED claims for the specific conditions.

Claims and costs for adults enrolled in Medi-Cal were based on 2004 data from California's Department of Health Services, Office of Fiscal Forecasting and Data Management. Due to the two-year lag, the 2004 claims were adjusted to 2006 values,[16] and payments per selected condition were inflated to reflect actual California state-specific medical cost changes during that period.

Next, the prevalence of these three risk factors was combined with the medical care data for each county through a process developed by the authors known as the Proportionate Risk Factor Cost Appraisal™ (PRFCA). The PRFCA uses findings from published studies in peer-reviewed scientific journals to estimate the proportion of people who have a given risk factor (the risk factor weight) for designated medical conditions (i.e., any of the 100 or so DRGs).

Finally, the estimated number of people in each county who have the medical condition was multiplied by the average cost to treat that condition to get the total cost to treat that condition by county. Treatment costs for all conditions were then summed to determine the cost of medical care for conditions associated with each risk factor.

To estimate indirect health care costs associated with a health condition, health care economists generally multiply direct medical costs by a factor ranging from 2 to 9.[17, 18] Indirect costs reflect any additional expense or lost opportunity that occurs in addition to the direct (immediate) medical cost associated with a medical condition. Examples of indirect costs include lingering or unexpected health problems that require additional medical care and/or prescription drugs, create additional stress or depression leading to a lower quality of life, or negatively affect an individual's ability to work at a level necessary for job promotion, greater earnings, and other advancement opportunities. In order to be conservative, the indirect costs were added as a multiple of 3.

Health Care Costs: Prescription Drugs

Prescription drug costs were assessed as complementary medical costs because they typically occur in conjunction with the provision of health care diagnoses or treatment. Prescription drug expenses associated with each of the targeted medical conditions are not available in a statewide database. Therefore, in order to calculate the approximate prescription drug costs associated with all of the targeted medical conditions for each of the three risk factors, claims data from several industry-leading drug utilization reports were used.[19, 20]

Lost Productivity Costs

For the analysis of lost productivity costs associated with overweight, obesity, and physical inactivity, three outcome measures were used: absenteeism, short-term disability, and presenteeism (i.e., the portion of an employee's work load they are unable to do because of their compromised health status). The analysis is based on published scientific research on the effect of each of the three risk factors on each of the three measures of lost productivity.[21]

To determine lost productivity costs associated with each of the three outcome measures, estimates were made of the average annual number of hours of lost work time per individual associated with the presence of each the three risk factors. These were then summed to reflect the overall average estimated impact of each risk factor for an individual (see Table A-3 on next page).

Based on applicable regional and state data sources, the total cost of the lost productivity was then computed for each county using county- and state-specific data on risk-factor prevalence, the number of workers, and the average salary in the county.

TABLE A-3

Estimated Average Annual Number of Hours of Lost Work Time, per Individual, Associated with Overweight, Obesity, and Physical Inactivity, California, 2006

	Overweight	Obesity	Physical Inactivity
Absences	4.08 hours	12.43 hours	15.75 hours
Short-term disability	4.86 hours	14.78 hours	13.00 hours
Presenteeism	8.94 hours	27.19 hours	28.75 hours
TOTAL	**17.88 hours**	**54.40 hours**	**57.50 hours**
% Annual work*	0.89%	2.72%	2.80%

** Based on an annual workload of 2,000 hours.*

Study Limitations

Although this study was based on the best data available, the findings are limited by the following factors:

- The prevalence rates of overweight, obesity, and physical inactivity that were applied to each county are based on self-reports from respected state and national population-based surveys. Self-reported data are generally recognized as being underreported.[22]
- The risk factor weights were based on a review of published studies for the general adult population. These weights could change as research findings are refined over time.
- In cases where specific health care cost data were not available, estimates were made. These include Medi-Cal managed care plan data, pharmaceutical drug costs paid by private and employer-paid sources, and employer-paid outpatient medical claims and cost data. The latter were estimated based on norms developed from the author's in-house California corporate database.
- Because county-specific lost productivity data were not available, national norms were used to estimate risk-factor-based absenteeism, short-term disability, and presenteeism rates.
- Lost productivity costs by county were based on the assumption that people work in the counties in which they live.

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