

**The Future Costs of Obesity:
National and State Estimates of the Impact of Obesity on Direct Health Care
Expenses**

A collaborative report from United Health Foundation, the American Public Health Association and
Partnership for Prevention

Based on research by Kenneth E. Thorpe, Ph.D. of Emory University

Updated
November 2009

www.americashealthrankings/2009/spotlight.aspx

EXECUTIVE SUMMARY

Higher Obesity → Higher Costs

In a unique study that departed from looking at historical costs of obesity, Kenneth E. Thorpe, Ph.D., and colleagues from Emory University developed an econometric model to estimate the growth of health care costs over time that are attributable to changes in obesity rates. This report provides projections of future health care costs directly attributable to obesity for each state and for the nation.

Using nationally representative data on adults, the study estimates the effect of the increasing prevalence of obesity on total direct health care costs. Estimates are controlled for age, gender, race, ethnicity, marital status, education, income, health insurance status, geographic region and smoking status.

Major Findings:

- *Obesity is growing faster than any previous public health issue our nation has faced. If current trends continue, 103 million American adults will be considered obese by 2018.*
- *The U.S. is expected to spend \$344 billion on health care costs attributable to obesity in 2018 if rates continue to increase at their current levels. Obesity-related direct expenditures are expected to account for more than 21 percent of the nation's direct health care spending in 2018.*
- *If obesity levels were held at their current rates, the U.S. could save an estimated \$820 per adult in health care costs by 2018 - a savings of almost \$200 billion dollars.*
- *At the state level, Oklahoma stands to benefit the most if obesity levels remain steady. This would provide a potential savings of \$1,200 per adult or a savings of more than \$3.2 billion for the state.*
- *Oklahoma is expected to have the highest obesity rate in the country by 2018; Colorado is estimated to have the lowest obesity rate.*

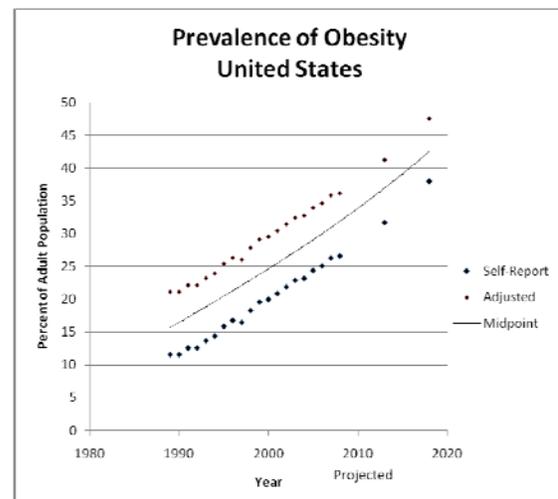
Obesity:

Obesity is described as the fastest growing public health challenge the nation has ever faced – and its rapid increase has crossed all socio-economic groups. Obesity is attributable to inadequate activity, unhealthy eating habits and changing food alternatives. The Centers for Disease Control and Prevention described the current situation as:

“American society has become 'obesogenic,' characterized by environments that promote increased food intake, nonhealthful foods, and physical inactivity.”¹

The rise in the prevalence of adult obesity has been well documented over the last 20 years increasing from 12 percent in 1989 to 27 percent in 2008.² While this level of obesity appears high, the true prevalence of obesity is likely to be substantially higher as it has been shown to be under-reported by

Figure 1: Prevalence of Obesity



¹ <http://www.cdc.gov/obesity/index.html> accessed Oct 25, 2009

² BRFSS data, www.cdc.gov/brfss

approximately 9.5 percent because of the tendency of individuals to understate their weight on telephone surveys, the method of data collection used for these studies.³ So, obesity levels are most likely substantially higher than often quoted. Using this information, Dr. Thorpe projected expected obesity levels in 2013 and 2018 based upon self-reported data and adjusted these projections for likely under-reporting (Figure 1 and Table 1).

Table 1: Estimated Prevalence of Obesity in the United States

Estimated Prevalence of Obesity United States (Percent of Adult Population)			
	Lower Estimate (Self-Reported)	Midpoint	Upper Estimate (Adjusted)
2008	26.5%	31.3%	36.0%
2013	31.7%	36.5%	41.2%
2018	38.0%	42.8%	47.5%

Table 4 on page 9 contains midpoint, lower and upper estimates for each state. In 2018, Colorado is projected to be the only state that will have a prevalence of adult obesity that is less than 30 percent. In contrast, Oklahoma, Mississippi, Maryland, Kentucky, Ohio and South Dakota will all have adult obesity levels over 50 percent.

Financial Implications:

Obesity takes a toll on physical health, but it also places a financial burden on the health care delivery system to treat increased illness as a result of obesity-related health challenges. Erik Finkelstein, Ph.D and others have estimated that as much as \$75 billion dollars of our public health cost bill was attributable to obesity in 2003, about half of which was publically financed.⁴

Three factors contribute to the increasing burden of treating obesity; the increase in the number of people that are obese, the increasing cost of treatments specific to obesity-related illnesses and the demographic shift in population with a general trend for older individuals to be obese. The first cause, an increasing number of obese individuals, is the cause that is most amenable to change – individuals, community leaders, elected officials, employers and healthcare professionals can develop individual and community interventions that slow the rise in obesity.

At the national level, in 10 years, the U.S. is expected to spend over \$343 billion on health care costs that are attributable to obesity if rates continue to increase at their current levels. Individual state estimates are contained in Table 5.

In 2018, the cost of obesity at a national level is projected to be \$1,425 per person, rising from \$361 per adult today; direct health costs for obesity will be four times as much in ten years as they are today. Table 6 presents the obesity-attributable direct health care cost per adult person in each state. Obviously, this parallels the prevalence of obesity and shows that per-capita costs are highest in

³ Yun, S., et.al. “A comparison of national estimates of obesity prevalence from the behavioral risk factor surveillance system and the national health and nutrition examination survey, International Journal of Obesity, 2006, Vol 30, pg 164-170.

⁴ Finkelstein, Eric, et al. “State-level estimates of annual medical expenditures attributable to obesity, Obesity Research, 2004;12:1:18-24.

Oklahoma, Ohio, Kentucky, Missouri and Mississippi and lowest in Colorado, Connecticut, Virginia, Massachusetts and Rhode Island. Table 2 and 3 summarize the top and bottom five states by per-capita obesity-attributable direct health care costs.

Table 2: Lowest Expenditures: Obesity-Attributable Health Care Spending (\$/Adult)

	Obesity-Attributable Health Care Spending (\$/Adult)*		
	2008	2013	2018
Colorado	\$235	\$378	\$864
Connecticut	\$279	\$455	\$1,052
Virginia	\$327	\$492	\$1,053
Massachusetts	\$296	\$482	\$1,119
Rhode Island	\$293	\$491	\$1,163

*Mid-point estimates

Table 3: Highest Expenditures: Obesity-Attributable Health Care Spending (\$/Adult)

	Obesity-Attributable Health Care Spending (\$/Adult)*		
	2008	2013	2018
Oklahoma	\$417	\$747	\$1,906
Ohio	\$433	\$755	\$1,877
Kentucky	\$433	\$750	\$1,836
Missouri	\$450	\$761	\$1,834
Mississippi	\$441	\$738	\$1,757

*Mid-point estimates

The Cost of Inaction:

If obesity could be checked at current rates, future health care expenditures could be reduced. Current obesity levels are too high for sustainable good health, but curbing the rate of increase is a first step. A recent study showed that adding labeling to restaurant menus has the potential to impact individual behavior and to stop almost half of the rate of increase in obesity levels.⁵ Other methods, such as taxing high-calorie sodas, also have been shown to be compelling.⁶

Halting the rise in obesity rates will have an economic benefit of \$198 billion in the United States in 2018. Table 7 shows the total savings that could be expected in five and 10 years by state if obesity rates were held at current levels.

⁵ Kuo, Tony et. al, "Menu Labeling as a Potential Strategy for Combating the Obesity Epidemic: A Health Impact Assessment," Am J Public Health. 2009;99:1680–1686.

⁶ Brownell, Kelly D., et. al., The Public Health and Economic Benefits of Taxing Sugar-Sweetened Beverages, Published at www.nejm.org September 16, 2009 (10.1056/NEJMp0905723)

On a per person basis, the average savings in the United States is \$821 per adult per year in 2018. It varies by state as is shown in Table 8. These savings do not include the other economic and health benefits that would accrue including reduced absenteeism, increased productivity and improved sense of wellness.

Methodology

Data for the analysis came from two primary sources including the 2006 Household Component to the Medical Expenditure Panel Survey (MEPS-HC) and 1998 through 2008 Behavioral Risk Surveillance System (BRFSS) files. In addition to the core datasets, Centers for Medicare and Medicaid Services (CMS) estimates of per capita health care expenditures to project spending into 2013 and 2018, and Gross Domestic Product(GDP) deflator to inflate predicted health care expenditures from 2006 to 2008 dollars were used. Lastly, Census population projections developed by the Bureau of Labor Statistics by gender, age, and state were used to standardize population counts.

National Model

A national model for predicting health care expenditures attributable to obesity was developed using the MEPS data. The MEPS survey is conducted by the Agency for Healthcare Research and Quality(AHQR) and provides nationally representative estimates of healthcare spending, insurance status, utilization of medical services, sources of payments, and disease prevalence along with a broad set of socioeconomic characteristics for the non-institutionalized civilian population in the U.S.⁷ The household component data are collected through computer-assisted personal interviews, and are supplemented by information provided by the medical providers and business establishments associated with survey participants. Excluded from the analysis are pregnant women (7 observations), respondents under the age of 20 (11,163), those with missing BMI data and BMI under 10 (990), resulting in an analytical sample of 21,985. Records with missing data on educational attainment and self-reported health status were also omitted, restricting the sample further to 21,744 observations.

While the survey provides a breadth of information on health spending patterns, its narrow definition of expenditures as “payments made for health care services” presents a major limitation in policy studies aiming at assessment of total outlays for healthcare. Specifically, the MEPS-HC design omits administrative costs, does not account for services for which no explicit payment or charge was recorded, and fails to adjust for payments to providers not linked to a service event, in addition to being prone to attrition of high-cost cases, underreporting, and some misclassification of expenditures across the board.⁸ A number of researchers used AHQR technical reports to align MEPS-HC expenditure data with National Health Expenditure Accounts (NHEA) producing health care spending estimates for the whole population or adult subset. Selden et al.(2007) using 2006 data found that the MEPS definition of health care spending undercounts total healthcare expenditures by nearly a half and suggested a 1.552 upward adjustment of total expenditures to approximate NHA totals. For purposes of this simulation, no adjustments to spending data were made.

Following the guidelines developed by the Centers for Disease Control and Prevention, the Body-Mass Index measure using self-reported information on weight and height (calculated as weight in kilograms divided by the square of height in meters) was constructed for each respondent in the sample.

⁷ For more details see Cohen et al (1996), (2009);

⁸ Selden et al. (2007); Selden et al. (1996); Bovbjerg et al. (2006);

Respondents were classified as underweight (BMI under 18.5), normal weight (BMI between 18.5 and 24.9), overweight (BMI between 25.0 and 29.9), and obese (BMI 30.0 or higher)⁹.

A two-part general linear model (GLM) with Gamma Log-link transformation was used to model healthcare expenditures¹⁰. Including BMI indicators allowed us to partial out the effect of obesity on spending while netting out the impact of other observed characteristics. Both parts of the model included controls for age(20-24, 25-34, 45-54, 55-64, 65-84, and 85+), BMI category (“Underweight”, “Overweight”, “Obese”), gender, race (Black, Hispanic, Other), marital status, education (“Less than high school”, “High school Graduate/GED”, “Some College”), family size, family income as a percent of Federal Poverty Line (FPL) (“Under 100% FPL”, “100-199% FPL”, “300-399% FPL”, “400% FPL +”), work status, self-employed indicator, overall health status (“Good”, “Fair”, “Poor”), insurance status, MSA, and region indicators (Midwest, South, and West). To better align the MEPS data with BRFSS, the individual income variable on family level were summed and re-coded the aggregate value into BRFSS income thresholds (\$0-\$9,999, \$10,000-\$14,999, \$15,000-\$19,999, \$20,000-\$24,999, \$25,000-\$34,999, \$35,000-\$49,999, \$50,000-\$74,999, \$75,000+). Categorical income was further evaluated against the relevant poverty threshold, with ambiguous cases (lower income bound below the threshold and higher income bound above the threshold) assigned into corresponding FPL grouping based on the mid-point value of the income threshold.

Regressions were evaluated using complex survey design facility in Stata 9 SE.

State Level Model

The 2008 BRFSS data were used to predict state-level health care expenditures and the share of spending attributable to obesity. The BRFSS is a collaborative project of the Centers for Disease Control and Prevention (CDC) and U.S. states and territories. Administered by the CDC, the survey is designed to measure behavioral risk factors for the adult population (18 years of age or older) living in households. Data on preventive health practices and risk behaviors that are linked to chronic diseases, along with a wide array of socio-demographic characteristics are collected via a randomized telephone survey. Estimates from the survey are representative of the adult population aged 18 years and older and could be evaluated on the national level as well as by state and county¹¹.

BRFSS data were coded analogously with the MEPS conventions and similarly restricted to adults over 19, not-pregnant, and with valid BMI information, resulting in a sample of 331,508 observations.

Assuming returns to demographics, BMI, and socio-economic characteristics in 2006 were representative of 2008 level, predicted coefficients from the 2006 MEPS sample were applied to 2008 BRFSS data to predict health care spending for everyone in the BRFSS sample. To account for inflationary

⁹ U.S. Centers for Disease Control and Prevention, “What Is BMI?,” 17 April 2003. (www.cdc.gov/nccdphp/dnpa/bmi/bmi-adult.htm)

¹⁰ The two-part models approach was developed by the researchers at RAND Randomized Health Insurance Experiment is now commonly used in health economics literature Manning et al (1987), Manning (1998); We ran the data through routines proposed in Manning and Malluhy (2001) and found that GLM with Gamma Log-Link transformation fit our data best; The first part of the model captures the probability of incurring any expenditures, while the second evaluates spending among those with positive expenditures;

¹¹ For further details on the survey refer to Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Behavioral Risk Surveillance System, Survey Data and Documentation.(for 2008 BRFSS overview: http://www.cdc.gov/brfss/technical_info_data/survey_data/2008.htm)

trends between the two periods the GDP deflator was applied to predicted totals thus expressing spending in terms of 2008 dollars¹².

The methodology described in Finkelstein et al (2004) was followed to assess the level of health care expenditures and percent of total health care spending attributable to obesity. Focusing on the obese sub-set, the added cost of obesity was evaluated by computing the difference in predicted health spending for the subgroup in current BMI status and under normal weight.

Estimates were produced using complex survey design facility in Stata 9, SE. Person level weights were standardized by gender, age, and state to add up to population totals as reported by the U.S Census Bureau. State interim population projections by age, gender, and state from 2004 to 2030 are based on Census 2000 results and the general assumption that recent state-specific trends in fertility, mortality, domestic migration, and international migration will continue¹³.

To account for well documented under-reporting in BMI self-reported statistics, the aggregate was presented as a percent of the total health care expenditures for obesity-attributable spending assuming the true obesity prevalence was 9.5 percentage points above the level observed in self-reported data. These estimates, however, should be interpreted with care since this simulation assumes that the added cost of obesity under the true prevalence and under self-reported distribution are the same. If the obese are misreporting weight and height and thus appear in the data as normal weight or overweight, it suggests that the added cost of obesity is understated, thus under the true prevalence the attributable spending would be higher and account for a larger share of total expenditures.

Projected Obesity and Obesity-Attributable Spending

Assuming per capita health care spending projections developed by the CMS indirectly account for changes in population characteristics, including the surge in obesity prevalence¹⁴, growth in projected per capita spending was used to inflate our 2008 expenditure estimates to 2013 and 2018 levels¹⁵.

To further assess the burden of obesity, the average annual change in percent population underweight, normal weight, overweight, and obese from 2003 to 2008 were evaluated. Then, using these five year state trends, BMI distribution was projected into 2013 and 2018 by applying the average annual growth raised to the power five and 10 respectively to 2008 BMI distribution. And finally, obesity-attributable spending for each state was determined by multiplying the added cost of obesity computed from 2008 data and inflated via per capita growth in spending by projected obesity prevalence.

References:

¹² GDP multiplier of 1.052;

¹³ Population totals by 5-year age bands, gender, and state were obtained from "File 2. Interim State Projections of Population for Five-Year Age Groups and Selected Age Groups by Sex: July, 1 2004 to 2030", U.S. Census Bureau, Population Division, Interim State Population Projections, 2005. (<http://www.census.gov/population/projections/DownldFile2.CSV>).

¹⁴ Centers for Medicare and Medicaid Services; Research, Statistics, Data and Systems; National Health Expenditures Data; "Projected: Projections of National Health Expenditures: Methodology and Model Specification." (<http://www.cms.hhs.gov/NationalHealthExpendData/downloads/projections-methodology.PDF>).

¹⁵ Per capita spending in 2008 was reported at \$7,804.3, in 2013 at \$9,767.3 resulting in a multiplier of 1.2515; Projected spending for 2018 was at \$13,100.3 yielding a multiplier of 1.6786. Source: Centers for Medicare and Medicaid Services; Research, Statistics, Data and Systems; National Health Expenditures Data; "National Health Expenditure Projections 2008-2018." (<http://www.cms.hhs.gov/NationalHealthExpendData/downloads/proj2008.pdf>).

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Tables:

The tables below show the detailed findings for the prevalence of obesity and its associated costs. Each reference point contains three values. The first value is the midpoint estimate of the two projections. The first number in the parentheses is the lower estimate based upon self-reported prevalence of obesity using BRFSS data. The second number in the parentheses is the estimated based upon self-report data after adjustment for bias, which is 9.5 percent.

Table 4: Prevalence of Obesity Estimates for 2008, 2013 and 2018 if Current Obesity Trend Continues

State	Prevalence of Obesity		
	Percent of Adult Population (Mid-point, lower and upper estimates)		
	2008	2013	2018
Alabama	36.3% (31.5% - 41.0%)	42.4% (37.6% - 47.1%)	49.3% (44.5% - 54.0%)
Alaska	31.4% (26.6% - 36.1%)	36.3% (31.6% - 41.1%)	42.3% (37.6% - 47.1%)
Arizona	30.4% (25.6% - 35.1%)	37.0% (32.2% - 41.7%)	45.1% (40.3% - 49.8%)
Arkansas	34.3% (29.6% - 39.1%)	41.0% (36.2% - 45.7%)	48.2% (43.5% - 53.0%)
California	28.8% (24.1% - 33.6%)	34.4% (29.6% - 39.1%)	41.3% (36.5% - 46.0%)
Colorado	23.8% (19.0% - 28.5%)	26.6% (21.9% - 31.4%)	29.8% (25.1% - 34.6%)
Connecticut	26.1% (21.3% - 30.8%)	29.5% (24.8% - 34.3%)	33.6% (28.9% - 38.4%)
Delaware	32.7% (28.0% - 37.5%)	38.1% (33.4% - 42.9%)	44.7% (39.9% - 49.4%)
Florida	29.4% (24.7% - 34.2%)	35.8% (31.1% - 40.6%)	43.9% (39.2% - 48.7%)
Georgia	32.0% (27.3% - 36.8%)	36.3% (31.6% - 41.1%)	41.4% (36.7% - 46.2%)
Hawaii	28.0% (23.3% - 32.8%)	36.6% (31.9% - 41.4%)	48.6% (43.8% - 53.3%)
Idaho	30.1% (25.4% - 34.9%)	36.0% (31.3% - 40.8%)	43.2% (38.5% - 48.0%)
Illinois	31.5% (26.8% - 36.3%)	37.0% (32.2% - 41.7%)	43.5% (38.8% - 48.3%)
Indiana	31.7% (26.9% - 36.4%)	34.3% (29.5% - 39.0%)	37.2% (32.5% - 42.0%)
Iowa	31.1% (26.3% - 35.8%)	34.4% (29.6% - 39.1%)	38.0% (33.2% - 42.7%)
Kansas	32.8% (28.0% - 37.5%)	38.8% (34.0% - 43.5%)	46.0% (41.3% - 50.8%)
Kentucky	34.8% (30.1% - 39.6%)	42.3% (37.5% - 47.0%)	51.2% (46.5% - 56.0%)
Louisiana	33.9% (29.2% - 38.7%)	38.0% (33.3% - 42.8%)	42.7% (38.0% - 47.5%)
Maine	30.3% (25.5% - 35.0%)	35.5% (30.8% - 40.3%)	41.9% (37.1% - 46.6%)
Maryland	31.2% (26.5% - 36.0%)	40.1% (35.4% - 44.9%)	52.1% (47.4% - 56.9%)
Massachusetts	26.0% (21.3% - 30.8%)	29.6% (24.9% - 34.4%)	33.9% (29.1% - 38.6%)
Michigan	34.4% (29.6% - 39.1%)	38.9% (34.2% - 43.7%)	44.3% (39.6% - 49.1%)
Minnesota	29.8% (25.1% - 34.6%)	33.0% (28.3% - 37.8%)	36.7% (32.0% - 41.5%)
Mississippi	37.7% (33.0% - 42.5%)	44.2% (39.5% - 49.0%)	52.2% (47.5% - 57.0%)
Missouri	33.5% (28.8% - 38.3%)	39.7% (35.0% - 44.5%)	47.4% (42.7% - 52.2%)
Montana	29.3% (24.5% - 34.0%)	35.5% (30.7% - 40.2%)	43.2% (38.5% - 48.0%)
Nebraska	32.0% (27.2% - 36.7%)	36.5% (31.7% - 41.2%)	41.7% (36.9% - 46.4%)
Nevada	30.9% (26.1% - 35.6%)	36.3% (31.6% - 41.1%)	42.9% (38.1% - 47.6%)
New Hampshire	29.1% (24.3% - 33.8%)	36.8% (32.1% - 41.6%)	47.1% (42.4% - 51.9%)
New Jersey	28.1% (23.3% - 32.8%)	32.9% (28.2% - 37.7%)	38.7% (33.9% - 43.4%)
New Mexico	30.6% (25.9% - 35.4%)	36.9% (32.2% - 41.7%)	44.6% (39.9% - 49.4%)
New York	29.4% (24.7% - 34.2%)	34.3% (29.5% - 39.0%)	40.2% (35.4% - 44.9%)
North Carolina	34.2% (29.5% - 39.0%)	40.1% (35.3% - 44.8%)	47.1% (42.4% - 51.9%)
North Dakota	32.4% (27.6% - 37.1%)	36.3% (31.5% - 41.0%)	40.7% (35.9% - 45.4%)
Ohio	33.9% (29.1% - 38.6%)	41.4% (36.6% - 46.1%)	50.9% (46.2% - 55.7%)
Oklahoma	35.2% (30.5% - 40.0%)	44.3% (39.6% - 49.1%)	56.1% (51.3% - 60.8%)
Oregon	29.2% (24.4% - 33.9%)	33.4% (28.7% - 38.2%)	38.5% (33.7% - 43.2%)
Pennsylvania	32.6% (27.9% - 37.4%)	36.8% (32.1% - 41.6%)	41.8% (37.0% - 46.5%)
Rhode Island	26.5% (21.7% - 31.2%)	31.0% (26.2% - 35.7%)	36.1% (31.4% - 40.9%)
South Carolina	35.6% (30.9% - 40.4%)	41.6% (36.8% - 46.3%)	48.1% (43.4% - 52.9%)
South Dakota	32.7% (27.9% - 37.4%)	40.5% (35.8% - 45.3%)	50.4% (45.6% - 55.1%)
Tennessee	35.3% (30.5% - 40.0%)	41.6% (36.8% - 46.3%)	49.8% (45.0% - 54.5%)
Texas	34.0% (29.2% - 38.7%)	38.1% (33.4% - 42.9%)	42.4% (37.7% - 47.2%)
Utah	27.9% (23.2% - 32.7%)	33.6% (28.8% - 38.3%)	40.4% (35.6% - 45.1%)
Vermont	27.8% (23.1% - 32.6%)	32.5% (27.7% - 37.2%)	38.0% (33.3% - 42.8%)
Virginia	30.2% (25.4% - 34.9%)	31.7% (26.9% - 36.4%)	33.4% (28.6% - 38.1%)
Washington	30.4% (25.7% - 35.2%)	35.5% (30.8% - 40.3%)	41.6% (36.9% - 46.4%)
West Virginia	36.7% (31.9% - 41.4%)	41.0% (36.3% - 45.8%)	46.1% (41.3% - 50.8%)
Wisconsin	30.7% (26.0% - 35.5%)	36.1% (31.3% - 40.8%)	42.4% (37.7% - 47.2%)
Wyoming	30.3% (25.5% - 35.0%)	37.8% (33.0% - 42.5%)	47.4% (42.7% - 52.2%)
United States	31.3% (26.5% - 36.0%)	36.5% (31.7% - 41.2%)	42.8% (38.0% - 47.5%)
District of Columbia	26.4% (21.7% - 31.2%)	27.7% (22.9% - 32.4%)	29.2% (24.4% - 33.9%)

Table 5: Obesity-Attributable Health Care Spending for 2008, 2013 and 2018 (\$Millions) if Current Obesity Trend Continues

State	Obesity-Attributable Health Care Spending (millions of dollars) (Midpoint, lower and upper estimates)		
	2008	2013	2018
Alabama	\$1,424 (\$1,238-\$1,611)	\$2,433 (\$1,895-\$2,970)	\$5,592 (\$3,683-\$7,501)
Alaska	\$157 (\$133-\$181)	\$276 (\$210-\$342)	\$680 (\$438-\$922)
Arizona	\$1,486 (\$1,254-\$1,719)	\$2,812 (\$2,146-\$3,477)	\$7,881 (\$5,127-\$10,635)
Arkansas	\$880 (\$758-\$1,001)	\$1,504 (\$1,166-\$1,842)	\$3,832 (\$2,516-\$5,147)
California	\$8,644 (\$7,219-\$10,068)	\$15,810 (\$11,920-\$19,700)	\$40,692 (\$26,124-\$55,259)
Colorado	\$809 (\$647-\$970)	\$1,363 (\$975-\$1,751)	\$3,235 (\$1,952-\$4,518)
Connecticut	\$735 (\$601-\$869)	\$1,234 (\$903-\$1,564)	\$2,907 (\$1,800-\$4,014)
Delaware	\$222 (\$190-\$254)	\$393 (\$302-\$485)	\$975 (\$634-\$1,317)
Florida	\$4,873 (\$4,086-\$5,659)	\$9,389 (\$7,129-\$11,649)	\$25,804 (\$16,726-\$34,883)
Georgia	\$2,540 (\$2,163-\$2,917)	\$4,429 (\$3,371-\$5,487)	\$10,846 (\$6,968-\$14,725)
Hawaii	\$307 (\$255-\$360)	\$601 (\$458-\$744)	\$1,576 (\$1,036-\$2,116)
Idaho	\$324 (\$273-\$375)	\$600 (\$456-\$744)	\$1,565 (\$1,012-\$2,118)
Illinois	\$3,568 (\$3,030-\$4,106)	\$5,866 (\$4,477-\$7,254)	\$14,779 (\$9,566-\$19,992)
Indiana	\$1,981 (\$1,684-\$2,278)	\$3,153 (\$2,376-\$3,930)	\$7,088 (\$4,472-\$9,703)
Iowa	\$852 (\$722-\$983)	\$1,370 (\$1,033-\$1,708)	\$3,088 (\$1,956-\$4,221)
Kansas	\$792 (\$677-\$906)	\$1,372 (\$1,055-\$1,689)	\$3,346 (\$2,183-\$4,508)
Kentucky	\$1,288 (\$1,112-\$1,463)	\$2,402 (\$1,870-\$2,933)	\$6,008 (\$3,976-\$8,040)
Louisiana	\$1,183 (\$1,017-\$1,348)	\$1,942 (\$1,489-\$2,396)	\$4,485 (\$2,895-\$6,074)
Maine	\$360 (\$303-\$416)	\$629 (\$477-\$781)	\$1,538 (\$989-\$2,086)
Maryland	\$1,441 (\$1,222-\$1,661)	\$2,807 (\$2,170-\$3,445)	\$7,686 (\$5,098-\$10,273)
Massachusetts	\$1,448 (\$1,184-\$1,712)	\$2,438 (\$1,786-\$3,089)	\$5,771 (\$3,577-\$7,964)
Michigan	\$3,186 (\$2,746-\$3,627)	\$5,327 (\$4,098-\$6,555)	\$12,490 (\$8,106-\$16,874)
Minnesota	\$1,475 (\$1,240-\$1,710)	\$2,466 (\$1,846-\$3,086)	\$5,798 (\$3,649-\$7,946)
Mississippi	\$925 (\$808-\$1,041)	\$1,595 (\$1,250-\$1,940)	\$3,877 (\$2,572-\$5,181)
Missouri	\$1,924 (\$1,651-\$2,196)	\$3,369 (\$2,600-\$4,138)	\$8,205 (\$5,376-\$11,034)
Montana	\$213 (\$179-\$248)	\$387 (\$294-\$481)	\$983 (\$636-\$1,331)
Nebraska	\$498 (\$424-\$572)	\$823 (\$627-\$1,020)	\$1,919 (\$1,234-\$2,604)
Nevada	\$595 (\$503-\$686)	\$1,146 (\$872-\$1,420)	\$3,099 (\$2,001-\$4,197)
New Hampshire	\$325 (\$272-\$378)	\$629 (\$480-\$778)	\$1,709 (\$1,119-\$2,299)
New Jersey	\$2,175 (\$1,807-\$2,543)	\$3,792 (\$2,837-\$4,748)	\$9,294 (\$5,904-\$12,684)
New Mexico	\$430 (\$364-\$497)	\$817 (\$624-\$1,011)	\$2,058 (\$1,337-\$2,779)
New York	\$4,870 (\$4,084-\$5,657)	\$8,289 (\$6,246-\$10,331)	\$19,808 (\$12,662-\$26,954)
North Carolina	\$2,439 (\$2,100-\$2,777)	\$4,395 (\$3,396-\$5,394)	\$11,146 (\$7,297-\$14,995)
North Dakota	\$180 (\$153-\$206)	\$292 (\$222-\$362)	\$663 (\$425-\$901)
Ohio	\$3,658 (\$3,145-\$4,172)	\$6,491 (\$5,039-\$7,942)	\$16,222 (\$10,729-\$21,715)
Oklahoma	\$1,069 (\$925-\$1,214)	\$1,963 (\$1,539-\$2,388)	\$5,102 (\$3,413-\$6,790)
Oregon	\$863 (\$722-\$1,003)	\$1,527 (\$1,145-\$1,909)	\$3,777 (\$2,397-\$5,157)
Pennsylvania	\$3,686 (\$3,149-\$4,222)	\$6,088 (\$4,643-\$7,532)	\$13,528 (\$8,702-\$18,355)
Rhode Island	\$227 (\$187-\$268)	\$417 (\$308-\$526)	\$1008 (\$633-\$1,384)
South Carolina	\$1,234 (\$1,069-\$1,398)	\$2,093 (\$1,626-\$2,560)	\$5,343 (\$3,508-\$7,178)
South Dakota	\$220 (\$188-\$252)	\$398 (\$308-\$488)	\$1,008 (\$666-\$1,351)
Tennessee	\$1,565 (\$1,354-\$1,775)	\$2,810 (\$2,183-\$3,437)	\$7,081 (\$4,669-\$9,493)
Texas	\$5,768 (\$4,962-\$6,574)	\$9,912 (\$7,602-\$12,222)	\$23,217 (\$14,970-\$31,465)
Utah	\$485 (\$403-\$568)	\$901 (\$676-\$1,126)	\$2,365 (\$1,513-\$3,217)
Vermont	\$151 (\$125-\$177)	\$266 (\$199-\$334)	\$655 (\$415-\$895)
Virginia	\$1,871 (\$1,576-\$2,165)	\$3,006 (\$2,232-\$3,779)	\$6,789 (\$4,196-\$9,381)
Washington	\$1,591 (\$1,343-\$1,840)	\$2,853 (\$2,163-\$3,543)	\$7,230 (\$4,648-\$9,812)
West Virginia	\$668 (\$581-\$754)	\$1,076 (\$835-\$1,318)	\$2,384 (\$1,556-\$3,212)
Wisconsin	\$1,593 (\$1,347-\$1,839)	\$2,778 (\$2,112-\$3,445)	\$6,788 (\$4,377-\$9,199)
Wyoming	\$128 (\$108-\$148)	\$235 (\$180-\$290)	\$607 (\$397-\$816)
United States	\$79,438 (\$67,377-\$91,499)	\$139,132 (\$105,966-\$172,298)	\$343,866 (\$222,040-\$465,692)
District of Columbia	\$116 (\$95-\$137)	\$168 (\$121-\$214)	\$341 (\$205-\$477)

Table 6: Obesity-Attributable Health Care Spending for 2008, 2013 and 2018 (\$/adult) if Current Obesity Trend Continues

State	Obesity-Attributable Health Care Spending (\$/Adult) (Midpoint, lower and upper estimates)		
	2008	2013	2018
Alabama	\$427 (\$371-\$482)	\$710 (\$553-\$867)	\$1,668 (\$1,098-\$2,237)
Alaska	\$330 (\$280-\$380)	\$547 (\$416-\$677)	\$1,289 (\$831-\$1,747)
Arizona	\$330 (\$278-\$381)	\$574 (\$438-\$709)	\$1,412 (\$918-\$1,905)
Arkansas	\$427 (\$368-\$486)	\$728 (\$564-\$891)	\$1,730 (\$1,136-\$2,324)
California	\$325 (\$271-\$379)	\$555 (\$418-\$691)	\$1,348 (\$865-\$1,830)
Colorado	\$235 (\$188-\$282)	\$378 (\$270-\$486)	\$864 (\$521-\$1,206)
Connecticut	\$279 (\$228-\$330)	\$455 (\$333-\$576)	\$1,052 (\$651-\$1,452)
Delaware	\$346 (\$296-\$396)	\$577 (\$442-\$711)	\$1,366 (\$887-\$1,844)
Florida	\$346 (\$290-\$401)	\$602 (\$457-\$747)	\$1,492 (\$967-\$2,016)
Georgia	\$385 (\$328-\$442)	\$624 (\$475-\$773)	\$1,442 (\$926-\$1,957)
Hawaii	\$319 (\$265-\$373)	\$595 (\$453-\$736)	\$1,593 (\$1,047-\$2,138)
Idaho	\$311 (\$262-\$360)	\$531 (\$403-\$658)	\$1,289 (\$833-\$1,744)
Illinois	\$385 (\$327-\$443)	\$646 (\$493-\$799)	\$1,538 (\$995-\$2,080)
Indiana	\$435 (\$370-\$500)	\$673 (\$507-\$839)	\$1,484 (\$936-\$2,032)
Iowa	\$388 (\$329-\$447)	\$613 (\$462-\$764)	\$1,375 (\$871-\$1,879)
Kansas	\$395 (\$338-\$452)	\$668 (\$514-\$822)	\$1,603 (\$1,046-\$2,160)
Kentucky	\$433 (\$374-\$492)	\$750 (\$584-\$916)	\$1,836 (\$1,215-\$2,456)
Louisiana	\$362 (\$311-\$412)	\$579 (\$444-\$714)	\$1,319 (\$851-\$1,786)
Maine	\$348 (\$293-\$402)	\$582 (\$441-\$723)	\$1,389 (\$894-\$1,884)
Maryland	\$341 (\$289-\$393)	\$626 (\$484-\$768)	\$1,642 (\$1,089-\$2,194)
Massachusetts	\$296 (\$242-\$349)	\$482 (\$353-\$611)	\$1,119 (\$694-\$1,544)
Michigan	\$424 (\$365-\$482)	\$685 (\$527-\$842)	\$1,578 (\$1,024-\$2,131)
Minnesota	\$379 (\$319-\$439)	\$601 (\$449-\$752)	\$1,355 (\$853-\$1,857)
Mississippi	\$441 (\$385-\$496)	\$738 (\$578-\$897)	\$1,757 (\$1,165-\$2,348)
Missouri	\$450 (\$386-\$513)	\$761 (\$587-\$934)	\$1,834 (\$1,201-\$2,466)
Montana	\$297 (\$249-\$345)	\$515 (\$390-\$640)	\$1,268 (\$820-\$1,716)
Nebraska	\$394 (\$335-\$452)	\$642 (\$489-\$795)	\$1,486 (\$955-\$2,016)
Nevada	\$322 (\$272-\$371)	\$541 (\$412-\$670)	\$1,291 (\$834-\$1,748)
New Hampshire	\$320 (\$267-\$372)	\$579 (\$441-\$716)	\$1,494 (\$978-\$2,010)
New Jersey	\$330 (\$274-\$385)	\$553 (\$414-\$692)	\$1,318 (\$837-\$1,799)
New Mexico	\$319 (\$269-\$368)	\$549 (\$419-\$679)	\$1,341 (\$871-\$1,811)
New York	\$341 (\$286-\$396)	\$568 (\$428-\$708)	\$1,348 (\$861-\$1,834)
North Carolina	\$371 (\$319-\$422)	\$620 (\$479-\$760)	\$1,473 (\$964-\$1,981)
North Dakota	\$382 (\$326-\$438)	\$612 (\$466-\$758)	\$1,391 (\$891-\$1,891)
Ohio	\$433 (\$372-\$494)	\$755 (\$586-\$924)	\$1,877 (\$1,241-\$2,512)
Oklahoma	\$417 (\$361-\$473)	\$747 (\$585-\$909)	\$1,906 (\$1,275-\$2,537)
Oregon	\$318 (\$266-\$369)	\$520 (\$390-\$650)	\$1,215 (\$771-\$1,659)
Pennsylvania	\$393 (\$335-\$450)	\$634 (\$483-\$784)	\$1,455 (\$936-\$1,974)
Rhode Island	\$293 (\$240-\$346)	\$491 (\$363-\$619)	\$1,163 (\$730-\$1,595)
South Carolina	\$387 (\$335-\$438)	\$644 (\$500-\$787)	\$1,505 (\$988-\$2,022)
South Dakota	\$390 (\$333-\$446)	\$689 (\$533-\$844)	\$1,729 (\$1,142-\$2,316)
Tennessee	\$355 (\$307-\$403)	\$597 (\$463-\$730)	\$1,442 (\$951-\$1,933)
Texas	\$348 (\$299-\$396)	\$557 (\$427-\$687)	\$1,255 (\$809-\$1,701)
Utah	\$298 (\$247-\$348)	\$513 (\$385-\$640)	\$1,248 (\$798-\$1,698)
Vermont	\$309 (\$256-\$362)	\$516 (\$385-\$647)	\$1,226 (\$776-\$1,675)
Virginia	\$327 (\$275-\$378)	\$492 (\$365-\$618)	\$1,053 (\$651-\$1,455)
Washington	\$337 (\$284-\$389)	\$562 (\$426-\$698)	\$1,333 (\$857-\$1,809)
West Virginia	\$479 (\$417-\$541)	\$764 (\$592-\$935)	\$1,736 (\$1,133-\$2,339)
Wisconsin	\$381 (\$322-\$440)	\$639 (\$486-\$792)	\$1,523 (\$982-\$2,063)
Wyoming	\$331 (\$279-\$383)	\$591 (\$452-\$729)	\$1,498 (\$981-\$2,014)
US	\$361 (\$306-\$415)	\$601 (\$457-\$744)	\$1,425 (\$920-\$1,930)
District of Columbia	\$288 (\$236-\$340)	\$433 (\$312-\$553)	\$933 (\$560-\$1,305)

Table 7: Savings if Obesity Remains Constant for 2013 and 2018 (\$Million) if Obesity Stays at 2008 Rates

	Obesity-Attributable Health Care Savings (\$Million)	
	(Midpoint, lower and upper estimates)	
	2013	2018
United States	\$34,747 (\$17,429-\$52,064)	\$198,175 (\$98,469-\$297,881)
Alabama	\$604 (\$305-\$902)	\$3,193 (\$1,597-\$4,788)
Alaska	\$68 (\$33-\$102)	\$388 (\$190-\$585)
Arizona	\$790 (\$440-\$1,139)	\$4,794 (\$2,522-\$7,065)
Arkansas	\$400 (\$215-\$585)	\$2,246 (\$1,150-\$3,341)
California	\$4,220 (\$2,240-\$6,199)	\$24,219 (\$12,366-\$36,072)
Colorado	\$302 (\$126-\$478)	\$1,757 (\$769-\$2,744)
Connecticut	\$284 (\$127-\$441)	\$1,610 (\$739-\$2,481)
Delaware	\$98 (\$49-\$147)	\$561 (\$279-\$842)
District of Columbia	\$29 (\$7-\$50)	\$165 (\$60-\$269)
Florida	\$2,643 (\$1,472-\$3,813)	\$15,770 (\$8,311-\$23,228)
Georgia	\$1,013 (\$461-\$1,564)	\$5,988 (\$2,830-\$9,145)
Hawaii	\$198 (\$123-\$273)	\$1,047 (\$596-\$1,497)
Idaho	\$161 (\$86-\$235)	\$932 (\$478-\$1,385)
Illinois	\$1,490 (\$761-\$2,219)	\$8,567 (\$4,290-\$12,843)
Indiana	\$603 (\$208-\$998)	\$3,601 (\$1,508-\$5,694)
Iowa	\$286 (\$114-\$457)	\$1,627 (\$717-\$2,536)
Kansas	\$356 (\$186-\$526)	\$1,962 (\$1,000-\$2,923)
Kentucky	\$666 (\$371-\$960)	\$3,627 (\$1,920-\$5,334)
Louisiana	\$424 (\$183-\$665)	\$2,420 (\$1,119-\$3,720)
Maine	\$160 (\$81-\$238)	\$893 (\$445-\$1,340)
Maryland	\$891 (\$545-\$1,237)	\$5,003 (\$2,823-\$7,182)
Massachusetts	\$568 (\$257-\$878)	\$3,214 (\$1,486-\$4,941)
Michigan	\$1,205 (\$546-\$1,864)	\$6,866 (\$3,259-\$10,472)
Minnesota	\$518 (\$208-\$828)	\$3,076 (\$1,360-\$4,791)
Mississippi	\$402 (\$207-\$597)	\$2,244 (\$1,145-\$3,343)
Missouri	\$876 (\$460-\$1,292)	\$4,830 (\$2,479-\$7,180)
Montana	\$108 (\$59-\$156)	\$597 (\$312-\$881)
Nebraska	\$192 (\$89-\$294)	\$1065 (\$507-\$1623)
Nevada	\$293 (\$150-\$436)	\$1,803 (\$904-\$2,701)
New Hampshire	\$194 (\$116-\$272)	\$1,096 (\$606-\$1,586)
New Jersey	\$963 (\$486-\$1,440)	\$5,392 (\$2,662-\$8,122)
New Mexico	\$224 (\$122-\$325)	\$1,237 (\$643-\$1,830)
New York	\$2,066 (\$1,027-\$3,104)	\$11,404 (\$5,614-\$17,194)
North Carolina	\$1,105 (\$563-\$1,647)	\$6,439 (\$3,243-\$9,634)
North Dakota	\$64 (\$27-\$100)	\$358 (\$164-\$551)
Ohio	\$1,833 (\$1,034-\$2,631)	\$9,937 (\$5,326-\$14,548)
Oklahoma	\$592 (\$352-\$832)	\$3,229 (\$1,793-\$4,665)
Oregon	\$362 (\$170-\$553)	\$2,123 (\$1,012-\$3,233)
Pennsylvania	\$1,366 (\$609-\$2,123)	\$7,402 (\$3,467-\$11,336)
Rhode Island	\$106 (\$53-\$159)	\$582 (\$283-\$881)
South Carolina	\$521 (\$263-\$778)	\$3,043 (\$1,515-\$4,571)
South Dakota	\$116 (\$67-\$165)	\$627 (\$340-\$914)
Tennessee	\$719 (\$373-\$1,064)	\$4,156 (\$2,138-\$6,174)
Texas	\$2,172 (\$943-\$3,400)	\$12,427 (\$5,687-\$19,166)
Utah	\$246 (\$133-\$359)	\$1,419 (\$728-\$2,109)
Vermont	\$67 (\$33-\$101)	\$378 (\$185-\$570)
Virginia	\$507 (\$127-\$886)	\$3,256 (\$1,220-\$5,292)
Washington	\$714 (\$358-\$1,070)	\$4,165 (\$2,061-\$6,269)
West Virginia	\$232 (\$100-\$364)	\$1,281 (\$596-\$1,966)
Wisconsin	\$704 (\$358-\$1,050)	\$3,935 (\$1,965-\$5,905)
Wyoming	\$70 (\$41-\$99)	\$381 (\$207-\$555)

Table 8: Savings if Obesity Remains Constant for 2013 and 2018 (\$/adult) if Obesity Stays at 2008 Rates

	Obesity-Attributable Health Care Savings (\$/Adult)	
	2013	2018
US	\$150 (\$75-\$225)	\$821 (\$408-\$1,234)
Alabama	\$176 (\$89-\$263)	\$952 (\$476-\$1,428)
Alaska	\$134 (\$65-\$202)	\$735 (\$360-\$1,109)
Arizona	\$161 (\$90-\$232)	\$859 (\$452-\$1,266)
Arkansas	\$194 (\$104-\$283)	\$1,014 (\$519-\$1,509)
California	\$149 (\$79-\$218)	\$802 (\$409-\$1,194)
Colorado	\$84 (\$35-\$133)	\$469 (\$205-\$732)
Connecticut	\$105 (\$47-\$162)	\$582 (\$267-\$897)
Delaware	\$144 (\$72-\$215)	\$785 (\$391-\$1,179)
District of Columbia	\$74 (\$18-\$129)	\$450 (\$164-\$736)
Florida	\$169 (\$94-\$244)	\$912 (\$480-\$1,343)
Georgia	\$143 (\$65-\$220)	\$796 (\$376-\$1,215)
Hawaii	\$196 (\$122-\$270)	\$1,057 (\$602-\$1,512)
Idaho	\$142 (\$76-\$208)	\$767 (\$394-\$1,140)
Illinois	\$164 (\$84-\$244)	\$891 (\$446-\$1,336)
Indiana	\$129 (\$44-\$213)	\$754 (\$316-\$1,192)
Iowa	\$128 (\$51-\$204)	\$724 (\$319-\$1,129)
Kansas	\$174 (\$91-\$256)	\$940 (\$479-\$1,400)
Kentucky	\$208 (\$116-\$300)	\$1,109 (\$587-\$1,630)
Louisiana	\$127 (\$55-\$198)	\$712 (\$329-\$1,094)
Maine	\$148 (\$75-\$220)	\$806 (\$402-\$1,210)
Maryland	\$199 (\$122-\$276)	\$1,069 (\$603-\$1,534)
Massachusetts	\$113 (\$51-\$174)	\$623 (\$288-\$958)
Michigan	\$155 (\$70-\$239)	\$867 (\$412-\$1,322)
Minnesota	\$127 (\$51-\$202)	\$719 (\$318-\$1,120)
Mississippi	\$186 (\$96-\$276)	\$1,017 (\$519-\$1,515)
Missouri	\$198 (\$104-\$291)	\$1,080 (\$554-\$1,605)
Montana	\$143 (\$78-\$208)	\$769 (\$402-\$1,136)
Nebraska	\$149 (\$69-\$229)	\$824 (\$392-\$1,256)
Nevada	\$139 (\$71-\$206)	\$751 (\$377-\$1,125)
New Hampshire	\$179 (\$107-\$250)	\$958 (\$530-\$1,386)
New Jersey	\$141 (\$71-\$210)	\$765 (\$377-\$1,152)
New Mexico	\$150 (\$82-\$218)	\$806 (\$419-\$1,192)
New York	\$142 (\$70-\$213)	\$776 (\$382-\$1,170)
North Carolina	\$156 (\$79-\$232)	\$851 (\$428-\$1,273)
North Dakota	\$134 (\$57-\$210)	\$750 (\$344-\$1,156)
Ohio	\$213 (\$120-\$306)	\$1,150 (\$616-\$1,683)
Oklahoma	\$226 (\$134-\$317)	\$1,207 (\$670-\$1,743)
Oregon	\$123 (\$58-\$188)	\$683 (\$326-\$1,040)
Pennsylvania	\$142 (\$63-\$221)	\$796 (\$373-\$1,219)
Rhode Island	\$125 (\$62-\$187)	\$671 (\$326-\$1,016)
South Carolina	\$160 (\$81-\$239)	\$858 (\$427-\$1,288)
South Dakota	\$201 (\$116-\$286)	\$1,075 (\$583-\$1,567)
Tennessee	\$153 (\$79-\$226)	\$846 (\$435-\$1,257)
Texas	\$122 (\$53-\$191)	\$672 (\$307-\$1,036)
Utah	\$140 (\$76-\$204)	\$749 (\$384-\$1,113)
Vermont	\$130 (\$64-\$196)	\$707 (\$346-\$1,067)
Virginia	\$83 (\$21-\$145)	\$505 (\$189-\$821)
Washington	\$141 (\$70-\$211)	\$768 (\$380-\$1,156)
West Virginia	\$165 (\$71-\$258)	\$933 (\$434-\$1,432)
Wisconsin	\$162 (\$82-\$242)	\$883 (\$441-\$1,325)
Wyoming	\$176 (\$103-\$249)	\$941 (\$511-\$1,370)