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By Y. Claire Wang, John Pamplin, Michael W. Long, Zachary J. Ward, Steven L. Gortmaker, and Tatiana Andreyeva

# Severe Obesity In Adults Cost State Medicaid Programs Nearly \$8 Billion In 2013

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**ABSTRACT** Efforts to expand Medicaid while controlling spending must be informed by a deeper understanding of the extent to which the high medical costs associated with severe obesity (having a body mass index of 35 kg/m<sup>2</sup> or higher) determine spending at the state level. Our analysis of population-representative data indicates that in 2013, severe obesity cost the nation approximately \$69 billion, which accounted for 60 percent of total obesity-related costs. Approximately 11 percent of the cost of severe obesity was paid for by Medicaid, 30 percent by Medicare and other federal health programs, 27 percent by private health plans, and 30 percent out of pocket. Overall, severe obesity cost state Medicaid programs almost \$8 billion a year, ranging from \$5 million in Wyoming to \$1.3 billion in California. These costs are likely to increase following Medicaid expansion and enhanced coverage of weight loss therapies in the form of nutrition consultation, drug therapy, and bariatric surgery. Ensuring and expanding Medicaid-eligible populations' access to cost-effective treatment for severe obesity should be part of each state's strategy to mitigate rising obesity-related health care costs.

Obesity is among the top health and health care challenges of our time, having tripled in prevalence since the 1980s.<sup>1-3</sup> In the United States more than one in three adults have obesity, and about one in seven have severe obesity,<sup>3</sup> which is defined as having a body mass index (BMI) of 35.0 kg/m<sup>2</sup> or higher—meaning that the person is more than 100 pounds above a healthy body weight.

Excess body fat increases an individual's risk for many health conditions, including type 2 diabetes, osteoarthritis, heart diseases, and several forms of cancer.<sup>4</sup> In addition to lower quality of life and frequent stigmatization,<sup>5</sup> adults with severe obesity face an exponentially higher risk of premature death<sup>6</sup> and of chronic disease and health care needs,<sup>7</sup> compared to individuals with moderate obesity (BMI = 30.0–34.9). The overall prevalence of obesity appeared to plateau in the

past several years. However, severe obesity continued to increase in both children<sup>8</sup> and adults.<sup>9,10</sup>

Rising obesity prevalence, combined with more intense treatments of diseases attributable to obesity, explained up to 27 percent of the inflation-adjusted growth in US health care spending in the period 1987–2001.<sup>11</sup> The latest published estimates using 2006 data suggested that obesity may be responsible for 6.7–10.7 percent of health care spending and that it imposes substantial cost burdens on the Medicare and Medicaid programs.<sup>12,13</sup>

Despite the health and cost implications of obesity, the Centers for Medicare and Medicaid Services (CMS) did not formally define it as a disease until 2004. Over the past decade several professional societies have highlighted the gaps in the development of and coverage for obesity therapy in clinical settings, particularly for pa-

**Y. Claire Wang** (ycw2102@columbia.edu) is an associate professor in the Department of Health Policy and Management at the Mailman School of Public Health, Columbia University, in New York City.

**John Pamplin** is a graduate student research assistant in the Department of Epidemiology, Mailman School of Public Health, Columbia University.

**Michael W. Long** is an assistant professor at the Milken Institute School of Public Health, the George Washington University, in Washington, D.C.

**Zachary J. Ward** is a programmer analyst in the Harvard T.H. Chan School of Public Health, in Boston, Massachusetts.

**Steven L. Gortmaker** is a professor in the Department of Social and Behavioral Sciences at the Harvard T.H. Chan School of Public Health.

**Tatiana Andreyeva** is an associate professor in the Department of Agricultural and Resource Economics and director of economic initiatives at the Rudd Center for Food Policy and Obesity, University of Connecticut, in Hartford.

tients struggling with severe obesity.<sup>14</sup> The role of severe obesity in overall obesity-related costs and who pays those costs remain less understood.

We analyzed nationally representative data to estimate obesity-related state-level health care expenditures among adults with severe obesity, with an emphasis on costs for Medicaid. The analyses were intended to inform states undergoing Medicaid expansion and to identify priorities in coverage decisions related to the treatment of severe obesity.

## Study Data And Methods

**STATE-LEVEL PREVALENCE OF OBESITY AND SEVERE OBESITY** Based on the definition of *adult obesity* from the Centers for Disease Control and Prevention (CDC)—having a BMI of 30 or greater—we subdivided individuals with obesity into those with moderate, or class 1, obesity (BMI = 30.0–34.9) and those with severe, or class 2 or 3, obesity (BMI ≥ 35.0).

State-level prevalence of obesity and severe obesity was based on 2013 data from the CDC's Behavioral Risk Factor Surveillance System (BRFSS). The largest health survey system in the world, the BRFSS collects height, weight, and numerous other health-related data from adults ages eighteen and older across all fifty states and the District of Columbia. It completes more than 400,000 telephone (landline and mobile) interviews each year.

State-level statistics on obesity have been used widely, notably in the CDC's obesity maps.<sup>15</sup> Because of self-report bias, however, these data tend to underestimate the proportion of the population with obesity.<sup>16,17</sup>

We developed a novel statistical matching method to adjust for this bias<sup>18</sup> (see the online Appendix).<sup>19</sup> This adjustment produced national BMI distributions and obesity prevalence estimates that closely matched the objectively measured BMI data in the National Health and Nutrition Examination Survey (NHANES). Using this method, we found that the adjusted prevalence of severe obesity in the BRFSS (13.8 percent) was 25 percent higher than the unadjusted BRFSS estimate and was not statistically different from the estimate in NHANES (14.2 percent).

**OBESITY-ATTRIBUTABLE HEALTH EXPENDITURES** We used data for 2007–12 from the Medical Expenditure Panel Survey (MEPS) to examine the extent to which obesity predicts higher medical expenditures in US adults ages eighteen and older, compared to their peers without obesity. This data source provides an update to previous published estimates.<sup>12,13</sup> MEPS contains information about sampled individuals' health

insurance status, sociodemographic characteristics (such as age, race/ethnicity, sex, and household income), and BMI.

Subjects who were pregnant (based on both self-reports and *International Classification of Diseases*, Ninth Revision [ICD-9], codes for medical visits) or for whom BMI or demographic information was missing were excluded from the analysis. In our main analysis, we also excluded individuals who were underweight (BMI less than 18.5) or who had extremely high health care expenditures (more than \$100,000 in a single year), possibly because of underlying medical conditions that caused both weight loss and high health care spending. To correct for biases in self-reported BMI in MEPS, we applied the same statistical matching method that we used for adjusting data from the BRFSS.

Our sample consisted of 117,948 people. Total annual medical spending was expressed in 2014 dollars after adjusting for inflation, using the medical component of the Bureau of Labor Statistics' Consumer Price Index.

Following a well-established approach,<sup>7,13,20</sup> we fitted a two-part model (see the Appendix)<sup>19</sup> to 2007–12 data from MEPS to estimate the medical expenditures attributable to having moderate and severe obesity. In the first part we fitted a logistic model to predict the probability of incurring any medical costs during the survey year. In the second part we used a generalized linear equation model to predict health expenditures among adults who incurred any costs.

Covariates in both models were age (18–44, 45–64, or 65 and older), sex, race/ethnicity (white, black, Hispanic, Asian, or other), insurance status (uninsured, with any public insurance, or with private insurance), smoking status (yes or no), marital status (single, married, divorced or separated, or widowed), education (less than high school, high school, some college, or college graduate), and geographical region (Northwest, Midwest, South, or West).

All statistical analyses were conducted using SAS, version 9.3. Sampling weights were applied to generate population-representative estimates. Survey procedures were adjusted for the complex sampling design, including stratification and clustering. Confidence intervals of the mean obesity-attributable spending were generated using bootstrapping with a thousand replications.

**STATE-SPECIFIC OBESITY-ATTRIBUTABLE EXPENDITURES AND PAYER MIX** Obesity-attributable expenditures for each state were calculated by multiplying the following four sets of estimates: state population size, by sex and age, based on 2013 census projections; age- and sex-specific bias-adjusted prevalence of moderate and severe obesity in adults in that state from

the 2013 data from the BRFSS; per capita obesity-attributable costs by age, sex, and severity of obesity, estimated from MEPS data; and a relative health care price multiplier for each state.

The health care price multiplier was based on published adjusted hospital expenses per inpatient day in 2013,<sup>21</sup> with the US average as the benchmark. For instance, Arizona had a relative price multiplier of 1.103 (\$2,380 versus the US average of \$2,157). This adjustment was intended to reflect the cost of offering comparable health services in different states.

Because BRFSS data lacked insurance coverage information, we estimated from MEPS data the prevalence ratios of having moderate and severe obesity among patients who were primarily covered by Medicare, Medicaid, or private insurers or who were uninsured (see Appendix 2.3).<sup>19</sup> In addition, the mean proportions of medical expenditures paid for by the primary source of insurance, by any other supplementary source, and out of pocket were estimated according to the primary source (for example, on average Medicaid beneficiaries pay 15 percent out of pocket, while people with private insurance pay about 31 percent).

These estimates were then combined with the 2013 Current Population Survey state-specific proportions of adults with Medicaid, Medicare, and other federal coverage (for example, coverage through the Department of Veterans Affairs); those covered by private plans; and those who were uninsured to obtain the number of adults with moderate and severe obesity by payer, and their payer's share of medical expenses.

In contrast to previous methods, this approach accounted for potential dual eligibility for Medicaid and Medicare, copayments, and differences in payer mix across obesity categories.

**LIMITATIONS** It is important to note several limitations of the study. First, although MEPS is the most comprehensive and population-representative survey of medical spending patterns among Americans, potential underreporting in MEPS data of health care utilization (when compared to CMS National Health Expenditure Accounts data) has been noted.<sup>22</sup> Because such underreporting appeared to be most significant among Medicaid recipients, our estimate of Medicaid's obesity-attributable expenditures is likely conservative.

Second, our analysis adjusted for health care cost variability across states. However, our study likely did not perfectly capture variations across states in actual service provision, reimbursement amounts, and practice patterns.

## Study Results

Having a BMI in the moderate obesity range predicted an increase of \$941 in annual per capita medical expenditures, relative to having a normal weight (Exhibit 1). For severe obesity the increase was \$1,980. When we included the costs of individuals with extremely high annual medical spending (more than \$100,000), these estimates changed only modestly (see Appendix 1.3).<sup>19</sup>

As noted earlier,<sup>23</sup> obesity-attributable spending is higher among women than among men,

### EXHIBIT 1

Annual Per Capita Health Care Spending Attributable To Obesity Among Men And Women With Moderate Or Severe Obesity

Age (years)	Moderate obesity				Severe obesity			
	Spending	95% CI	Paid by public programs	Paid by private plans	Spending	95% CI	Paid by public programs	Paid by private plans
<b>MEN</b>								
18-44	\$ 441	348, 535	20%	41%	\$ 944	836, 1,375	25%	37%
45-64	968	747, 1,188	20	41	2,099	1,843, 2,354	24	40
65 and older	1,607	1,215, 2,000	73	5	3,322	2,882, 3,762	73	5
<b>WOMEN</b>								
18-44	550	426, 674	23	37	1,205	1,061, 1,348	28	35
45-64	1,109	843, 1,375	22	39	2,403	2,102, 2,703	28	35
65 and older	1,855	1,391, 2,319	73	5	3,949	3,423, 4,475	73	5
<b>MEN AND WOMEN</b>								
18 and older	941	722, 1,161	40	27	1,980	1,739, 2,220	41	27

**SOURCE** Authors' analysis of data for 2007-12 from the Medical Expenditure Panel Survey. **NOTES** Moderate obesity is having a body mass index (BMI) of 30.0-34.9; it is also referred to as class 1, or low-risk, obesity. Severe obesity is having a BMI of 35.0 or higher; it is subdivided into class 2, or moderate-risk, obesity (BMI = 35.0-39.9) and class 3, or high-risk, obesity (BMI ≥ 40.0). For information on people who were excluded from the sample of 117,948 people, see the text. Public programs are Medicaid and Medicare. Costs not covered by public programs or private plans are paid out of pocket or from miscellaneous sources. CI is confidence interval.

and it increases dramatically by age for both sexes (Exhibit 1). Compared to having moderate obesity, having severe obesity predicts having more than twice the obesity-attributable medical spending across all age groups and for both men and women. Increases in medical costs associated with overweight (BMI = 25.0–30.0) were not statistically significant and therefore were excluded from our obesity-attributable expenditure calculations.

Across adults of all ages, public sources paid for approximately 41 percent of the obesity-attributable expenditures associated with severe obesity (Exhibit 1). The breakdown was 30 percent for Medicare and other federal sources and 11 percent for Medicaid (data not shown). Private insurance paid for approximately 27 percent (Exhibit 1), and approximately 30 percent was paid for out of pocket. When we considered only adults younger than age sixty-five, the population most affected by the Affordable Care Act (ACA) and Medicaid expansion efforts, Medicaid paid for 13 percent of obesity-attributable expenditures associated with severe obesity, while commercial plans paid for 36 percent (data not shown).

In the fifty states and the District of Columbia, we estimated that 81.5 million adults had obesity. Of these, 33.7 million (41 percent) had severe obesity (Exhibit 2). In 2013, severe obesity was associated with \$69 billion of total medical costs across all payers (Exhibit 2), which accounted for 60 percent of the total costs from all levels of obesity (\$116 billion; Appendix Table A.8).<sup>19</sup> In that year, severe obesity cost state Medicaid programs approximately \$7.8 billion and cost Medicare and other federal health programs another \$21 billion (Exhibit 2). A table containing all data for each state and the District of Columbia is in the online Appendix (Appendix Table A.11).<sup>19</sup>

When we accounted for differences in population size, obesity prevalence, and health care costs at the state level, we found that annual costs of severe obesity ranged from an estimated \$64 million in Wyoming (with about 58,000 adults who had severe obesity) to more than \$9.1 billion in California (with 3.2 million adults who had severe obesity; Exhibit 2).

Although prevalence played a role, the costs of obesity and severe obesity were heavily influenced by population size and local costs of health care (Appendix Figure A.1).<sup>19</sup> We found higher prevalence of severe obesity among nonelderly adults with Medicaid or Medicare, compared to those with private or no insurance (Appendix Table A.6).<sup>19</sup>

On a per capita basis, states with the highest obesity-related health care expenditures in 2013

## Many states will see a substantial increase in obesity-related expenditures in their Medicaid programs.

were not necessarily the states with the highest prevalence of obesity. For example, Oregon and Washington had the highest per capita obesity-related health expenditures (\$768 and \$766, respectively), while Wyoming and Hawaii had the lowest (\$279 and \$281, respectively; Exhibit 3). The states with the highest prevalence of obesity (West Virginia, Mississippi, and Tennessee) did not rank high in per capita obesity-related expenditures, primarily because of the relatively low cost of health care in these states.

Payer mix also varied across states. For example, in 2013, 6 percent of Kansas adults under age sixty-five were on Medicaid, while the share in the District of Columbia was 22 percent (US average: 12 percent; data not shown). Twenty-eight percent of nonelderly adults in Texas were uninsured, compared to only 5 percent in Massachusetts (US average: 19 percent).

The cost to Medicaid of severe obesity ranged from just over \$5 million a year in Wyoming to approximately \$1.3 billion in California (Exhibit 2). For nonelderly adults, Medicaid paid an average of 13 percent of the costs attributable to severe obesity (range: 8–23 percent; data not shown). In Delaware, Maine, Vermont, and the District of Columbia, Medicaid paid more than 20 percent of the costs. In comparison, employer-based commercial payers bore the largest share of the costs for both severe obesity (36 percent; range: 32–44 percent) and total obesity (38 percent; range: 33–44 percent) among the nonelderly population.

### Discussion

In this analysis we used the most current data sources available to estimate the impact on state-level health care costs of severe obesity, a health condition that currently affects 14 percent of US adults. In 2013 an estimated \$69 billion in medical costs was attributed to severe obesity. Of that total, approximately \$8 billion was paid by Medicaid, \$21 billion by Medicare and other federal programs, \$18 billion by private payers, and

\$22 billion by patients and other miscellaneous sources.

Our study added to existing evidence on the importance of drawing attention to the substantial and growing population with severe obesity.<sup>10</sup> While public health efforts to improve food and physical activity environments to prevent obesity should continue, our results highlight the urgent need to increase access to and use of intensive clinical treatments for severe obesity.

In the context of Medicaid expansion, which will add an estimated eighteen million nonelderly Americans to Medicaid if all states expand eligibility for the program,<sup>24</sup> many states will see a substantial increase in obesity-related expenditures in their Medicaid programs. For instance, Medicaid expansion in Ohio was predicted to increase the number of Medicaid-eligible adults in the state by 71.7 percent, which could raise obesity-attributable Medicaid expenditures by more than \$100 million (Appendix Table A.9).<sup>19</sup>

Effective and cost-effective prevention and treatment of moderate and severe obesity should therefore be part of the conversations about Medicaid's efforts to contain costs. Few studies have been able to pinpoint the differences in total expenditures incurred by children who have obesity and those who do not.<sup>23,25-28</sup> However, since Medicaid covers a large number of US children, the rise in severe obesity in children and adolescents<sup>8</sup> and the resulting surge in childhood type 2 diabetes and adolescent bariatric surgery warrants close attention at the state level in the years to come.<sup>29</sup>

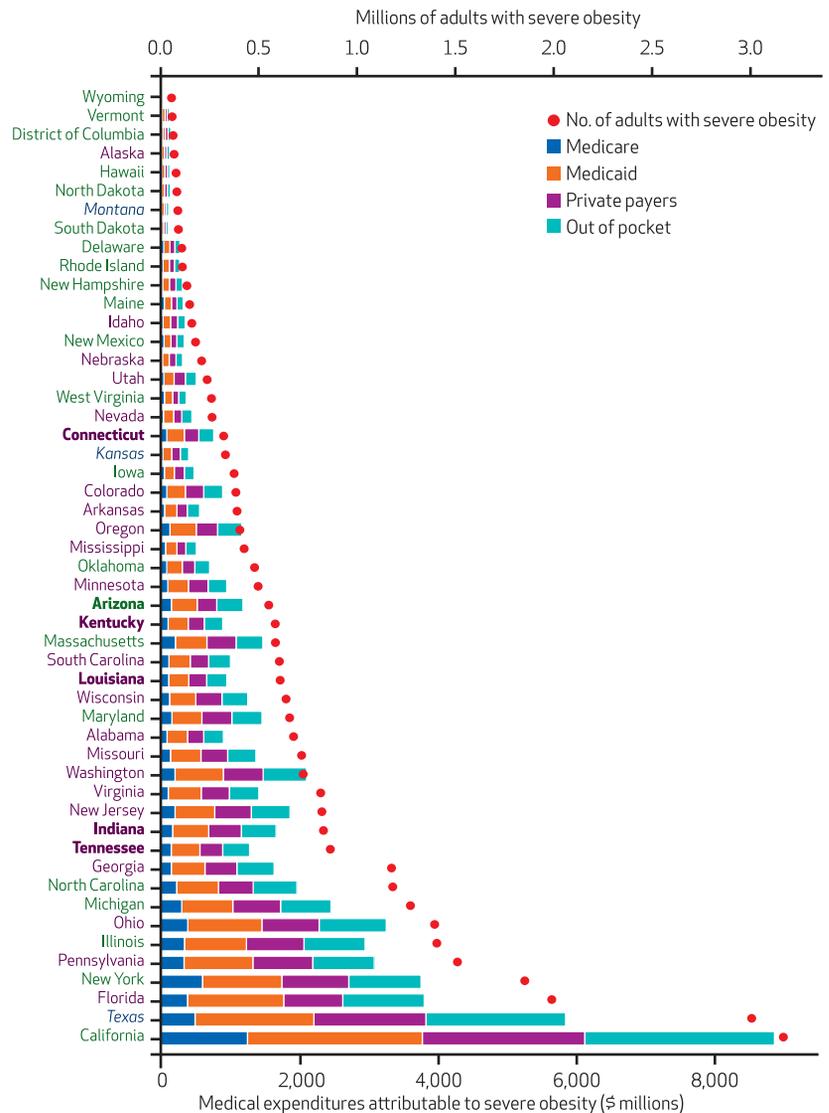
Severe obesity also represents an incentive and an opportunity for health promotion by employers. For adults younger than age sixty-five, our data suggest that employer-based private plans covered over 36 percent of obesity-related health care costs, which amounted to annual total costs of \$17 billion for severe obesity and \$12 billion for moderate obesity.

Furthermore, a recent study showed that working adults with severe obesity were absent on 40 percent more workdays because of health, compared to workers with normal weight.<sup>30</sup> This finding is consistent with the results of other studies that have called attention to the substantial productivity losses in the workplace resulting from severe obesity.<sup>31,32</sup> Many innovations in promoting wellness and weight management in the workplace have shown promise and are becoming common practice,<sup>33,34</sup> potentially leading to downstream cost savings.<sup>33</sup>

Our findings are consistent with previous studies on this topic,<sup>7,23</sup> albeit with some differences in the methods used. For example, using

**EXHIBIT 2**

**Coverage For Obesity Treatments And Medical Expenditures In 2013 Attributable To Severe Obesity, By State And Payer**

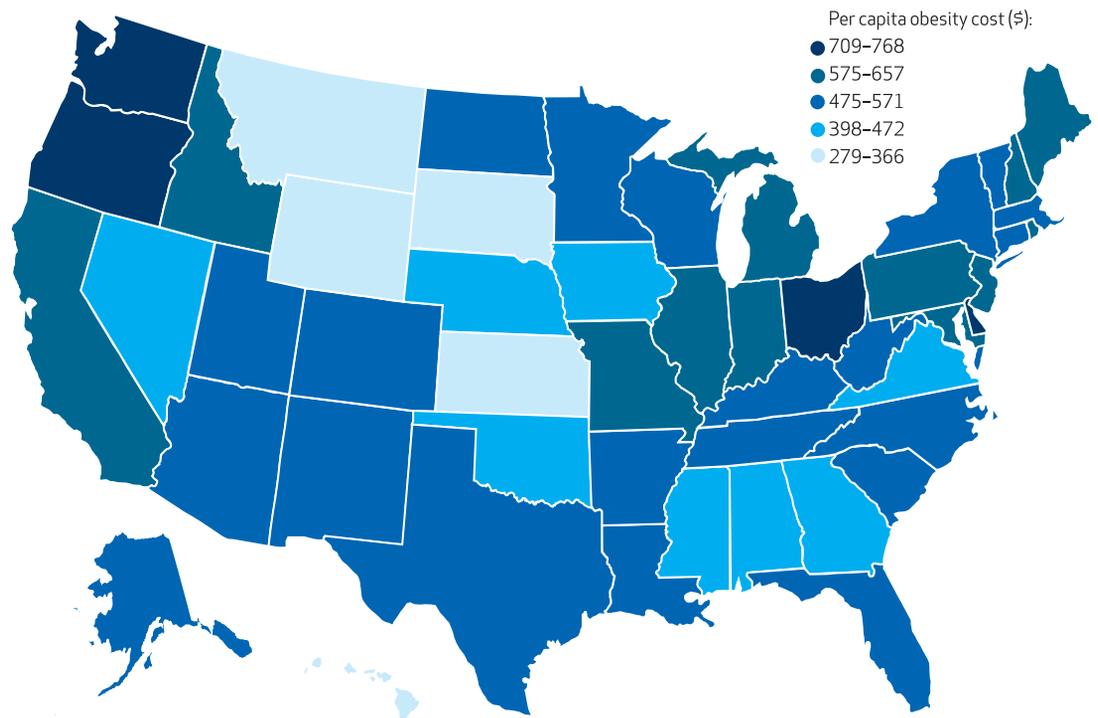


**SOURCE** Authors' analysis of data from the following sources: Medical Expenditure Panel Survey; Behavioral Risk Factor Surveillance System; Current Population Survey; for benchmark plan coverage, Gallagher C. OCC health policy memo (Note 41 in text); and for Medicaid coverage, Lee JS, et al. Coverage of obesity treatment (Note 40 in text). **NOTES** All costs are expressed in 2014 dollars after inflation adjustment using the Consumer Price Index Medical Component. Covered services vary by state and plan; they include bariatric surgery, nutrition consultation, drug therapy, and weight loss programs. States with names in dark red have coverage through both Medicaid and the benchmark plan. Those with names in dark green have either; all but New Jersey (benchmark only) have Medicaid only. Those with names in dark blue italics have no coverage. States with names in boldface have no restrictions on covered services, such as requiring preauthorization. Medicare includes all other federal health programs except Medicaid. A table with comprehensive values and a complete list of types of covered services and restrictions by state is available in the Appendix (see Note 19 in text). Total number of adults with severe obesity (represented by red dots and relating to the top axis) in all states: 33.7 million. Total spending by payer (represented by bars and relating to the bottom axis) in all states: all payers: \$69.2 billion (data not shown); Medicaid: \$7.8 billion; Medicare: \$20.9 billion; private payers: \$18.2 billion; and out of pocket: \$20.5 billion (sum does not match total because of rounding and because miscellaneous sources were not shown).

earlier MEPS data (from 2000-05), Eric Finkelstein and coauthors estimated \$1,492 higher annual per capita spending among adults

## EXHIBIT 3

## Per Capita Obesity-Related Health Care Expenditures, 2013



**SOURCE** Authors' analysis of 2013 data from the Current Population Survey, and the Behavioral Risk Factor Surveillance System and of 2007–12 data from the Medical Expenditure Panel Survey. **NOTE** All costs are expressed in 2014 dollars after inflation adjustment using the Consumer Price Index Medical Component.

with obesity, compared to spending among adults with normal weight, resulting in \$86 billion spending nationally (7–11 percent higher annual medical expenditures).<sup>12,13</sup> Our estimates were higher—\$116 billion<sup>35</sup>—which may be due to our better adjustment for self-report error in BRFSS and MEPS<sup>13</sup> and to our having separately accounted for higher spending among adults with severe obesity.

In addition, using an instrumental variable method to address reporting error in BMIs and the issue of endogeneity, John Cawley and Chad Meyerhoefer suggested that the medical costs of obesity might be much higher than previously believed.<sup>36</sup> And David Arterburn and co-authors focused on the most severe level of obesity—morbid, or high-risk, obesity (BMI of 40.0 or greater)—and attributed \$11 billion in medical costs in 2000 to the condition.<sup>7</sup>

Our findings also reiterate the importance of accounting for the severity of obesity<sup>7,37</sup> and obesity-attributable costs in different age and sex groups.<sup>23</sup>

Our study answered a timely, policy-relevant question based on the best data available. Nonetheless, there is a pressing need for better, longer-term, and intervention-driven data to use in

drawing inferences on whether reducing obesity can indeed translate to health care cost savings at the population level. Efforts to date, including our own, that estimated obesity-attributable expenditures using cross-sectional data such as those from MEPS are potentially limited by confounding that might not be fully controlled for by using regression or instrumental variable methods. The observed higher health care costs from obesity could reflect not only the effect of excess body fat but also the cost of unhealthy behavior patterns, such as having a poor diet and being sedentary. Removing obesity without fundamental improvements in these behaviors could result in lower, unchanged, or higher health care expenditures.<sup>38</sup>

Some researchers have even argued that reducing obesity could lead to higher health care costs because of increased longevity.<sup>39</sup> However, their arguments largely ignore the tremendous toll that obesity takes on health, well-being, economic productivity, and possibly even social welfare.

While most state Medicaid programs covered some forms of obesity care in 2013, only twenty-six provided nutrition consultation, and only ten provided drug therapy (Exhibit 2). In contrast, forty-five covered bariatric surgery.<sup>40</sup> A 2012

# Given the expansion of insurance coverage, the impact of obesity on health care spending will clearly be a moving target.

overview of states' essential health benefit plans<sup>41</sup> indicated that twenty-two states chose benchmark plans that covered bariatric surgery, five chose plans that covered weight loss programs, and twenty-eight chose plans that covered neither (Exhibit 2).

Given the expansion of insurance coverage and the ACA mandate for insurance plans to cover obesity screening and counseling, the impact of obesity on health care spending will clearly be a moving target. Based on the latest guidelines for the management of overweight and obesity in adults from the American College of Cardiology, the American Heart Association, and the Obesity Society, released in 2013,<sup>14</sup> 64.5 percent of US adults are now candidates for weight management treatment—24.2 million more people than would have been eligible according to the 1998 guidelines.<sup>42</sup> Under the 2013 recommendations, up to 53.4 percent of nonpregnant adults could be considered for pharmacologic therapy, and up to 14.7 percent could be candidates for bariatric surgery.<sup>42</sup>

Consistent with recommendations of the US Preventive Services Task Force, in November 2011 CMS began covering intensive, multicomponent behavioral therapy for obesity in primary care settings.<sup>43</sup> However, ensuring that patients attend enough sessions (at least 12–26 per year) will be critical to their success.<sup>14</sup> Traditionally, US clinicians have been more comfortable treating obesity-related health consequences such as high cholesterol and hypertension than delivering counseling and treatment for obesity.<sup>44</sup> Filling the gaps in clinical training, human resources, and reimbursement is an urgent challenge for the field as it expands capacity to tackle the demand for a variety of treatment approaches to obesity.

For adults with severe obesity, broad-reaching

policy and environmental changes (such as caloric labeling and beverage taxes) may not be sufficient. Effective and cost-effective clinical strategies will be required to reduce the excess weight and to mitigate related comorbidities such as type 2 diabetes. Since Medicare expanded its coverage of bariatric surgery in 2006, there has been a surge in bariatric surgery among both beneficiaries eligible because of age and those eligible because of disability.<sup>45</sup> Because bariatric surgery costs approximately \$20,000, expanding Medicaid coverage beyond that procedure to include behavioral weight-loss programs, drug therapy, or both has been advocated.

There remain many barriers to patients' receiving drug therapy or bariatric surgery, including lack of insurance coverage, stigma, and perceived risks.<sup>42</sup> One opinion poll of a nationally representative online sample showed that there is a high level of public support for insurance coverage for clinical weight management services (86 percent for mental health services and 84 percent for dietitian services) for adolescents with severe obesity, and that Americans remain largely receptive to services generally considered outside of the health care setting (for example, 65 percent supported insurance coverage for exercise programs, and 60 percent supported it for group programs such as Weight Watchers).<sup>46</sup> However, the poll also found markedly lower support for covering bariatric surgery under Medicaid (55 percent) than for covering it under private plans (81 percent), which suggests potential barriers for enhancing access to the procedure for lower-income individuals. To our knowledge, no similar polls were available regarding treatment in adults, which is a key gap in knowledge about public support for expanding coverage for clinical weight management services.

## Conclusion

Severe obesity is disproportionately responsible for a sizable demand for health care services and for costs to taxpayers and employers alike, totaling \$69 billion per year. In the context of ongoing efforts to expand Medicaid and control spending, this estimate is likely to be of particular concern for policy makers in states with high burdens of severe obesity, high health care costs, or both. Ensuring and expanding Medicaid-eligible populations' access to effective and cost-effective treatments for severe obesity should be part of the strategy to mitigate rising health care costs related to obesity. ■

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## NOTES

- 1 National Center for Health Statistics. Health, United States, 2013: with special feature on prescription drugs [Internet]. Hyattsville (MD): National Center for Health Statistics; 2014 [cited 2015 Sep 1]. Available from: <http://www.cdc.gov/nchs/data/abus/abus13.pdf>
- 2 Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999–2010. *JAMA*. 2012;307(5):483–90.
- 3 Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA* 2014;311(8):806–14.
- 4 Guh D, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis. *BMC Public Health*. 2009;9:88.
- 5 Puhl RM, Brownell KD. Psychosocial origins of obesity stigma: toward changing a powerful and pervasive bias. *Obes Rev*. 2003;4(4):213–27.
- 6 Flegal KM, Kit BK, Orpana H, Graubard BI. Association of all-cause mortality with overweight and obesity using standard body mass index categories: a systematic review and meta-analysis. *JAMA*. 2013;309(1):71–82.
- 7 Arterburn DE, Maciejewski ML, Tsevat J. Impact of morbid obesity on medical expenditures in adults. *Int J Obes (Lond)*. 2005;29(3):334–9.
- 8 Skinner AC, Skelton JA. Prevalence and trends in obesity and severe obesity among children in the United States, 1999–2012. *JAMA Pediatr*. 2014;168(6):561–6.
- 9 Sturm R, Hattori A. Morbid obesity rates continue to rise rapidly in the US. *Int J Obes (Lond)*. 2013;37(6):889–91.
- 10 Finkelstein EA, Khavjou OA, Thompson H, Trogdon JG, Pan L, Sherry B, et al. Obesity and severe obesity forecasts through 2030. *Am J Prev Med*. 2012;42(6):563–70.
- 11 Thorpe KE, Florence CS, Howard DH, Joski P. The impact of obesity on rising medical spending. *Health Aff (Millwood)*. 2004;25(4):w480–6. DOI: 10.1377/hlthaff.w4.480.
- 12 Finkelstein EA, Trogdon JG, Cohen JW, Dietz W. Annual medical spending attributable to obesity: payer- and service-specific estimates. *Health Aff (Millwood)*. 2009;28(5):w822–31. DOI: 10.1377/hlthaff.w822.
- 13 Trogdon JG, Finkelstein EA, Feagan CW, Cohen JW. State- and payer-specific estimates of annual medical expenditures attributable to obesity. *Obesity (Silver Spring)*. 2012;20(1):214–20.
- 14 American College of Cardiology/American Heart Association Task Force on Practice Guidelines, Obesity Expert Panel, 2013. Executive summary: guidelines (2013) for the management of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Obesity Society published by the Obesity Society and American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Based on a systematic review from the The Obesity Expert Panel, 2013. *Obesity (Silver Spring)*. 2014;22(Suppl 2):S5–39.
- 15 Centers for Disease Control and Prevention. Data, trends, and maps: obesity prevalence maps [Internet]. Atlanta (GA): CDC; [last updated 2015 Jun 16; cited 2015 Sep 1]. Available from: <http://www.cdc.gov/obesity/data/prevalence-maps.html>
- 16 Yun S, Zhu BP, Black W, Brownson RC. A comparison of national estimates of obesity prevalence from the Behavioral Risk Factor Surveillance System and the National Health and Nutrition Examination Survey. *Int J Obes (Lond)*. 2006;30(1):164–70.
- 17 Connor Gorber S, Tremblay M, Moher D, Gorber B. A comparison of direct vs. self-report measures for assessing height, weight, and body mass index: a systematic review. *Obes Rev*. 2007;8(4):307–26.
- 18 Ward Z, Long MW, Resch S, Gortmaker SL, Cradock AL, Hsiao A. Redrawing the US obesity landscape: bias-corrected estimates of state-specific adult obesity. Paper presented at: 142nd American Public Health Association Annual Meeting and Exposition; 2014 Nov 15–19; New Orleans, LA.
- 19 To access the Appendix, click on the Appendix link in the box to the right of the article online.
- 20 Trasande L, Liu Y, Fryer G, Weitzman M. Effects of childhood obesity on hospital care and costs, 1999–2005. *Health Aff (Millwood)*. 2009;28(4):w751–60. DOI: 10.1377/hlthaff.w751.
- 21 Henry J. Kaiser Family Foundation. Hospital adjusted expenses per inpatient day, 2013 [Internet]. Menlo Park (CA): KFF; [cited 2015 Sep 1]. Available from: <http://kff.org/other/state-indicator/expenses-per-inpatient-day/>
- 22 Sing M, Banthoin JS, Selden TM, Cowan CA, Keehan SP. Reconciling medical expenditure estimates from the MEPS and NHEA, 2002. *Health Care Financ Rev*. 2006;28(1):25–40.
- 23 Bell JF, Zimmerman FJ, Arterburn DE, Maciejewski ML. Health-care expenditures of overweight and obese males and females in the Medical Expenditures Panel Survey by age cohort. *Obesity (Silver Spring)*. 2011;19(1):228–32.
- 24 Kenney GM, Huntress M, Buettgens M, Lynch V, Resnick D (Urban Institute, Washington, DC). State and local coverage changes under full implementation of the Affordable Care Act [Internet]. Washington (DC): Kaiser Commission on Medicaid and the Uninsured; 2013 Jul 31 [cited 2015 Sep 1]. Available from: <http://kff.org/health-reform/report/state-and-local-coverage-changes-under-full-implementation-of-the-affordable-care-act/>
- 25 Wright DR, Prosser LA. The impact of overweight and obesity on pediatric medical expenditures. *Appl Health Econ Health Policy*. 2014;12(2):139–50.
- 26 Janicke DM, Harman JS, Jamoom EW, Simon SL, Zhang J, Dumont-Driscoll M. The relationship among child weight status, psychosocial functioning, and pediatric health care expenditures in a Medicaid population. *J Pediatr Psychol*. 2010;35(8):883–91.
- 27 Trasande L, Chatterjee S. The impact of obesity on health service utilization and costs in childhood. *Obesity (Silver Spring)*. 2009;17(9):1749–54.
- 28 Au N. The health care cost implications of overweight and obesity during childhood. *Health Serv Res*. 2012;47(2):655–76.
- 29 Pratt JSA, Lenders CM, Dionne EA, Hoppin AG, Hsu GLK, Inge TH, et al. Best practice updates for pediatric/adolescent weight loss surgery. *Obesity (Silver Spring)*. 2009;17(5):901–10.
- 30 Andreyeva T, Luedicke J, Wang YC. State-level estimates of obesity-attributable costs of absenteeism. *J Occup Environ Med*. 2014;56(11):1120–7.
- 31 Finkelstein EA, DiBonaventura Md,

- Burgess SM, Hale BC. The costs of obesity in the workplace. *J Occup Environ Med.* 2010;52(10):971–6.
- 32 Cawley J, Rizzo JA, Haas K. Occupation-specific absenteeism costs associated with obesity and morbid obesity. *J Occup Environ Med.* 2007;49(12):1317–24.
- 33 Trogdon J, Finkelstein EA, Reyes M, Dietz WH. A return-on-investment simulation model of workplace obesity interventions. *J Occup Environ Med.* 2009;51(7):751–8.
- 34 Anderson LM, Quinn TA, Glanz K, Ramirez G, Kahwati LC, Johnson DB, et al. The effectiveness of worksite nutrition and physical activity interventions for controlling employee overweight and obesity: a systematic review. *Am J Prev Med.* 2009;37(4):340–57.
- 35 Unlike Eric Finkelstein and co-authors (Notes 12 and 13), we did not adjust for the difference between MEPS and National Health Expenditure Accounts data. The adjustment led to an increase in their estimated obesity-attributable expenditures from \$86 billion to \$147 billion.
- 36 Cawley J, Meyerhoefer C. The medical care costs of obesity: an instrumental variables approach. *J Health Econ.* 2012;31(1):219–30.
- 37 Andreyeva T, Sturm R, Ringel JS. Moderate and severe obesity have large differences in health care costs. *Obes Res.* 2004;12(12):1936–43.
- 38 Weiner JP, Goodwin SM, Chang HY, Bolen SD, Richards TM, Johns RA, et al. Impact of bariatric surgery on health care costs of obese persons: a 6-year follow-up of surgical and comparison cohorts using health plan data. *JAMA Surg.* 2013;148(6):555–61.
- 39 Van Baal PH, Polder JJ, de Wit GA, Hoogveen RT, Feenstra TL, Boshuizen HC, et al. Lifetime medical costs of obesity: prevention no cure for increasing health expenditure. *PLoS Med.* 2008;5(2):e29.
- 40 Lee JS, Sheer JL, Lopez N, Rosenbaum S. Coverage of obesity treatment: a state-by-state analysis of Medicaid and state insurance laws. *Public Health Rep.* 2010;125(4):596–604.
- 41 Gallagher C. OCC health policy memo: summary of state benchmark plan coverage of obesity treatment services [Internet]. Silver Spring (MD): Obesity Care Continuum; 2012 Dec 4 [cited 2015 Sep 1]. Available from: <http://www.obesityaction.org/wp-content/uploads/1212-OCC-Summary-of-Obesity-Treatment-State-Benchmark-Plan-Coverage.pdf>
- 42 Stevens J, Oakkar EE, Cui Z, Cai J, Truesdale KP. US adults recommended for weight reduction by 1998 and 2013 obesity guidelines, NHANES 2007–2012. *Obesity (Silver Spring).* 2015;23(3):527–31.
- 43 Marincic P, Gray C. CMS coverage for obesity management. *JAAPA.* 2014;27(1):47–50.
- 44 Dietz WH, Baur LA, Hall K, Puhl RM, Taveras EM, Uauy R. Management of obesity: improvement of health-care training and systems for prevention and care. *Lancet.* 2015;385(9986):2521–33.
- 45 Habermann EB, Durham SB, Dorman R, Jarosek S, Virnig BA (University of Minnesota, Minneapolis, MN). Trends in bariatric surgery in Medicare beneficiaries [Internet]. Rockville (MD): Agency for Healthcare Research and Quality; 2012 Nov [cited 2015 Sep 2]. (AHRQ Publication No. 12-EHC104-EF). Available from: [http://effectivehealthcare.ahrq.gov/ehc/products/493/1340/Data-Points-17\\_20121130.pdf](http://effectivehealthcare.ahrq.gov/ehc/products/493/1340/Data-Points-17_20121130.pdf)
- 46 Woolford SJ, Clark SJ, Butchart A, Geiger JD, Davis MM, Fagerlin A. To pay or not to pay: public perception regarding insurance coverage of obesity treatment. *Obesity (Silver Spring).* 2013;21(12):E709–14.