Economic Impact of Obesity

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KEYWORDS

• Obesity • Economic impact • United States • Economic cost • Burden • Cost • Prevention • Primary care

KEY POINTS

- Medical costs associated with obesity range as high as $209.7 billion and account for more than 20% of all annual health care spending in the United States; estimates of the indirect costs from obesity are as high as $66 billion per year, which yield total (direct and indirect) cost outcomes that may exceed $275 billion annually.
- Much of the direct cost of obesity is attributable to treating high-cost comorbidities such as cardiovascular disease ($193–$315 billion) and type 2 diabetes ($105–$245 billion).
- If costs associated with obesity stayed constant and did not increase from 2010 to 2030, savings in medical spending would total $549.5 billion.
- Economists estimate that effective weight reduction could net cost-savings exceeding $610 billion in 20 years and implementation of food taxes would yield medical savings of more than $17 billion.
- The top 3 cost-saving interventions are environmental (including taxation of unhealthy foods and beverages); reduced advertising of unhealthy foods and beverages—particularly to children; and modifying nutrition labeling to better delineate foods that can be eaten in moderation from foods that can be consumed ad libitum.

In North America, two-thirds of US adults are classified as overweight or obese.[1] Overweight and obese individuals incur comorbidities that account for enormous health care expenditures. Medical costs associated with obesity are estimated to be as high as $209.7 billion.[2,3] This amount accounts for more than 20% of annual

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health care spending in the United States. In 1998, annual direct obesity-related costs in the United States were estimated at $74 billion, a figure that almost doubled to $147 billion by 2008.[3] It is suggested that the 37% increase in obesity rate (from 18% to 25% of the overall population) was a primary driver of cost increases during this time.[3]

Obesity is on the increase largely because of changing economics of food cost[4] and reduced opportunities for physical activity at work, school, and home.[4–6] The increase in obesity prevalence between 1987 and 2001 accounts for 27% (adjusted for inflation) of the increase in total US per-capita health care spending.[7] In 1987, the spending disparity between obese and healthy-weight individuals was 15%. This figure more than doubled by 2001, far out-pacing increases in overall per capita for the same period.[3]

Without corrective action, the costs associated with obesity are expected to increase[8] in parallel with increases in obesity prevalence.[3] In addition, the prevalence and incidence of chronic diseases are predicted to increase concurrently, further adding to obesity-related costs.[9,10] Reducing costs associated with obesity in North America's food-rich environment centers on effective prevention. Although many solutions have been proposed, an economically successful and sustainable strategy has yet to be used on a large scale.

This article reviews the available research on direct and indirect medical costs and future economic trends associated with obesity and weight-related comorbidities. Cost disparities associated with subsets of the population experiencing higher than average rates of obesity are summarized. The positive impact of even modest weight reduction on the economy and individual health is discussed. Potential high-impact solutions are offered, and future directions proposed.

INDIVIDUAL OBESITY SPENDING

The cost of obesity has been examined on an individual[2,3,7,11–13] and national[2,3,12,14–16] level. Each obese individual creates an estimated excess between $1429[3] and $2741[2] in annual medical costs. Obese individuals incur costs that are 42% higher than healthy-weight peers.[17] It is likely that current costs are higher than recent estimates due to rising rates of obese and morbidly obese persons and an elevated incidence of weight-related diseases. Cost increases in recent years are largely attributed to increases in obesity prevalence[3] rather than an increase in costs of medical care. It is likely that if rates of obesity continue to increase, costs will increase in tandem.

NATIONAL OBESITY SPENDING

Key Points

- The United States leads the world in obesity-related spending.
- Obesity-related medical treatment costs between $147 and $210 billion a year, roughly 10% of all annual medical spending (based on 2006 data).

In the United States, obesity was responsible for almost 10% of all medical spending in 2006 (equivalent to $85.7 billion in 2008 dollars). This amount of medical spending was nearly double the 1998 annual estimate of $42 billion (in 2008 dollars; 6% of total health costs).[3] The United States leads the world in obesity-related spending.[2] In countries with lower obesity rates, the obesity-related costs represent 0.7% to 2.8% of annual health care expenditures.[17]

DIRECT AND INDIRECT COSTS OF OBESITY

The cost of excess weight manifests in a variety of ways: from increased medical expenses that are relatively easy to observe and measure (most notably prescription expenditures and inpatient hospital services) to costs that are much less visible (for example, increases in gasoline and equipment costs secondary to excess weight). The direct costs of obesity are associated with the diagnosis and treatment of obesity and weight-related conditions, relevant health care services, and procedures. Indirect costs relate to morbidity and mortality and reflect events such as lost wages secondary to illness or disability and of a loss of future earnings due to premature death.

DIRECT COSTS OF OBESITY

Key Points

- Direct medical costs are 42% higher among obese adults compared with normal weight individuals.
- Medical spending associated with adult obesity approaches $210 billion a year.

There are multiple health care costs associated with the diagnosis and treatment of obesity. Diagnostic costs include laboratory and radiological tests that may be required to diagnose obesity-related diseases. Treatment costs include outpatient or inpatient health services, therapy (drug or nondrug), or surgeries. Direct costs also include physician reimbursement, ancillary, and home nursing services. Because obesity is associated with increased outpatient visits, inpatient hospital stays, and use of pharmacy and radiology services,[18] medical spending is increased in multiple payment arenas. As a result, direct medical costs are 42% higher in obese patients compared with healthy-weight peers.[3]

The risk of hospitalization is higher among people who are obese.[19] Inpatient hospital services currently consume nearly one-third of US health care spending.[19,20] Obese patients require more outpatient visits, have higher annual provider fees (37%), and have higher expenditures for prescription drugs.[3] Between 1998 and 2006, obesity-related spending for all payers increased substantially for inpatient services (46%), outpatient services (27%), and prescription drugs (80%). The percentage of costs attributable to obesity ranges from nearly 6% for noninpatient and 10% for inpatient care (excluding prescription drugs) to 15% of prescription medication costs.[3]

Cost estimations of large-scale problems such as obesity vary by study, making exact figures difficult to determine. As an example, data from Medical Expenditure Panel Surveys (MEPS) underestimate obesity-related costs because institutionalized patients were not included. The National Health Expenditure Accounts (NHEA) dataset includes institutionalized patients, a population who may be in poorer health than the general population and at increased risk for obesity. As a result, MEPS data attributed $86 billion in costs to obesity (2006) compared with NHEA estimates of $147 billion for the same year.[3]

A more recent study compared MEPS using a statistically more accurate instrumental variable approach. This methodology corrects for reporting error by including a biological child's body mass index (BMI) as a surrogate measure for an individual's self-reported BMI. By grouping the overweight with the obese, costs are likely underestimated because overweight does not incur as many additional medical costs as the obese population does, making the instrumental variable method likely more precise.[2] Using this updated method, the 2006 NHEA estimate of $147 billion spent annually on medical costs for obesity was modified to $209.7 billion.[2]

An examination of 16 US studies that estimated the total cost of obesity using retrospective (database, patient-attributable fraction; PAF) and prospective (modeling)

cost estimations of medical expenses linked to obesity[21] showed that cost outcomes greatly vary based on study design and method of analysis. Cost estimations are based on numerous medical expenses and each model can only account for so many variables. PAF studies allow for inferences about particular disease burden, which helps plan interventions, but does not provide a total burden of obesity (as database studies do). Database studies allow for examination of disparities in obesity linked to specific population traits (eg, demographics). Modeling studies provide more flexibility in terms of prospective cost forecasts. Predicted costs are extrapolated from existing figures; thus, each method has inherent limitations.[17,21–23]

INDIRECT COSTS OF OBESITY

In addition to the value of medical costs directly associated with the treatment of obesity and its comorbidities, there are numerous nonmedical costs that affect economic productivity.

Key Points

- Estimates of the indirect costs of obesity are as high as $66 billion per year. Total costs (direct and indirect) may exceed $275 billion annually.
- Aggregate obesity-attributable costs among full-time employees total $73.1 billion per year.
- Employers pay $6.4 billion per year for absenteeism and $30 billion per year because of reduced productivity attributed to obesity.
- Indirect costs related to the "built" environment (changes made to accommodate larger Americans–wider bus/plane seats, and sturdier hospital beds, ambulances, and wheelchairs) have an additional social impact.

Obesity impacts the work environment. Decreased productivity due to absenteeism and presenteeism (reduced productivity while at work), elevated costs paid for disability and insurance claims, reduced quality of life, and lost life years from premature mortality are associated with obesity. These indirect costs are estimated to be as high as $66 billion annually.[24]

LOST PRODUCTIVITY

Aggregate obesity-attributable annual indirect medical costs among full-time employees total $73.1 billion.[25] Obese workers have more short- and long-term absences from work than nonobese employees.[26] Productivity losses caused by obesity-related absenteeism in the United States range from $4.3 to $6.4 billion annually.[3,27] Reduced productivity costs employers an estimated $506 per obese worker annually.[28]

EMPLOYMENT/INSURANCE CLAIMS

Medical claims are higher among obese individuals as well. In addition to work day loss, obesity increases the risk of disability and is associated with higher employer's life insurance premiums and workers' compensation claims.[29,30] Obese workers' compensation claims average $51,091 per 100 full-time employees compared with $7503 among healthy-weight workers.[31]

QUALITY OF LIFE

Obesity adversely impacts quality of life.[30] There is some evidence that obesity is associated with lower per person wage and lower household income.[32] This

association may result in a higher probability of bankruptcy.[33] Obese individuals are also subject to social stigma and potential discrimination.[34] The number of productive life years is also reduced due to increased mortality associated with excess weight, and life expectancy decreases with rising BMI.[35]

In addition to costs associated with employment and quality of life, there are unique environmental challenges for emergency responders and health care providers. In order to transport obese patients and properly care for them in a hospital setting, sturdier equipment has been developed or modified from pre-existing structures. Supplemental medical equipment, such as beds, wheelchairs, and bedside commodes, is available to accommodate larger patients. In addition, conventional MRI and computed tomographic scanners may have weight limits or size restrictions that become problematic when delivering patient care. Updating or buying these new devices and equipment can be costly to the medical system.

IS OBESITY MORE EXPENSIVE THAN SMOKING?

Key Points

- Obesity exceeds smoking as the most expensive preventable disease.
- Morbid obesity increases medical costs by 50% annually. This amount is double the increase attributable to smoking (20%).

Obesity is surpassed only by tobacco use as the leading actual cause of death in the United States[36] Although obesity does not contribute to more deaths than smoking, it presents a far greater financial burden, adding more than twice ($2741) the cost of smoking ($1300) per person per year to the health care system.[2,36] Obesity, unlike smoking, does not drastically increase mortality. Although inactivity and obesity are independent risk factors for premature mortality, the overall associated costs for comorbid chronic diseases are higher when taking into consideration longer life spans and increased numbers of individuals with obesity. These increased obesity statistics raise health care costs for everyone; this is analogous to the burden of second-hand smoke. Of 30,529 Mayo Clinic adult employees and retirees, smoking added about 20% ($1274) per year to medical costs[37]; an added cost that was similar to obesity. Morbid obesity (defined as a BMI >40 kg/m^2) increased medical costs by 50% ($5530) per year.[37] With this shift in redefining the most expensive preventable disease in the United States, policymakers and private groups are attempting to find solutions to the obesity cost crisis using lessons learned from second-hand smoking.

COMORBIDITY COSTS

Key Point

- Much of the direct cost of obesity relates to treatment of high-cost comorbidities, such as cardiovascular disease (CVD; including hypertension and coronary heart disease; $193.4 billion) and type 2 diabetes ($105.7–$245 billion).

Obesity increases the risk for multiple diseases.[24] Treatment costs for weight-related diseases have risen significantly.[3] In 2000, total costs associated with obesity-related type 2 diabetes, coronary heart disease, hypertension, gall bladder disease, breast cancer, endometrial cancer, colon cancer, and osteoarthritis were estimated to be almost $117 billion per year.[38] Currently, treatment of obesity-related CVD (hypertension and coronary heart disease; $193.4 billion) and type 2 diabetes ($105.7 billion) exceeds total costs for treatment of obesity-related diseases just 15 years ago.[20]

Cardiovascular Disease

Nearly half of all US adults with CVD are obese.[39] More than 75% of hypertension cases are attributable to obesity. The American Heart Association estimates that direct and indirect costs of CVD (including stroke) total $315.4 billion annually.[40]

Type 2 Diabetes

Twenty years ago, 7.8 million Americans were diagnosed with diabetes. This number increased to approximately 29.1 million Americans in 2012 (many of whom are undiagnosed).[41] More than three-quarters (80%) of people with type 2 diabetes are overweight or obese.[41] Cost estimates from 2007 suggest that treatment costs associated with type 2 diabetes exceed $150 billion annually.[42]

FUTURE TRENDS

Key Points

- Two of 3 American adults are overweight or obese.
- The number of obese and morbidly obese individuals is projected to grow to 42% and 11%, respectively, over the next 15 years.
- Obese and morbidly obese patients have higher costs than overweight patients. The rising prevalence of morbid obesity will add substantial direct ($48–$66 billion) and indirect ($390–$580 billion) annual costs to the US health care system.
- By 2030, lost productivity due to obesity could total $580 billion annually and medical costs to treat preventable obesity-related diseases could increase by $48 to $66 billion per year.

Obesity in the United States has tripled since 1960. Morbid obesity has increased 6-fold, to 6% of the population.[1] If obesity continues to increase at current rates, by 2030, 65 million additional American adults will be obese (raising the obesity rate to 42%). The prevalence of morbid obesity will increase to 11%.[43] Even within the United States military, where service members are penalized for exceeding weight standards, there are excess costs[44] due to high rates of overweight male (54%) and female (34%) and obese (12% overall) service members.[45]

By 2030, lost productivity related to obesity could reach $580 billion annually. Medical costs for treatment of preventable obesity-related diseases could increase by $48 to $66 billion per year.[8] If total health care costs due to obesity in the United States double each decade (as expected), obesity-related cost would reach a staggering $860.7 to $956.9 billion per year.[16] If, however, 2010 obesity rates were to stay constant, savings in terms of cost-avoidance would approach $550 billion by 2030.[43]

SPECIAL POPULATIONS

Key Points

- There are considerable cost disparities between obese men and women.
- Direct medical costs are the primary cost driver for obese men.
- Nonmedical costs, including lost wages and absenteeism, are primary cost drivers among obese women.
- Morbidly obese patients are responsible for the highest cost expenditures.

Disparities by Weight Category and Gender

Overall annual costs are much higher for obese and morbidly obese individuals compared with overweight persons.[11] For men and women, the incremental cost of

obesity (men: $2646; women: $4879) are much higher than incremental costs of being overweight (men: $432; women: $524). Among overweight persons of both genders, the primary cost driver is direct medical costs, accounting for 80% and 66% of male and female adult costs annually. The annual costs associated with obesity are much lower for men ($2646) than women ($4879).

A more recent estimate[2] using data from nearly 23,000 patients with average BMI of 27 between the ages of 20 and 64 estimated that extra medical spending due to obesity totals $3613 annually for women and $1152 for men. Although estimates vary between studies, the bottom line is that, among women, costs increase as BMI exceeds 30 in large part due to job-related factors that affect the individual (eg, lower wages) and employers/society (eg, absenteeism), whereas medical spending for men does not significantly increase until BMI exceeds 35.[2]

Costs are increased even more among the severely obese (BMI 35 to <40) and morbidly obese (BMI >40). As BMI exceeds 35 kg/m^2, incremental costs increase significantly.[43] Direct medical costs are 3.5 times higher for moderately obese individuals.[11] Morbid obesity increases medical costs by up to 50%.[35,37] Morbid obesity is associated with an additional $6000 annual per capita spending.[35]

Older Adults

The prevalence of obesity in older adults is high.[46] About 35% of people 65 years and older were obese in 2007 to 2010.[9] Among adults aged 65 to 74, more than 40% are currently obese.[9] By 2050, the number of persons aged 65 and over in the United States is expected to more than double, rising from 40.2 million to 88.5 million.[47]

Approximately 8.5% of annual Medicare spending is directed toward obesity-related health costs.[3] This cost represents $50 billion of the $585 billion in 2013 Medicare spending.[48] Chronic medical comorbidities are more common among obese Medicare beneficiaries[49] and generate more treatment costs.[42] Some estimates predict substantial Medicare costs ranging from $3.4 to $4.7 billion over 10 years for 4% weight reduction among at-risk 60- to 64-year-old adults[50] to gross savings over 10 years of $7446 to $10,126 per capita with a 10% weight loss.[15] Given that Medicare Part D does not currently cover prescription weight-loss medications, Medicare likely bears a disproportionate burden of obesity and weight-related disease costs in the current market.

Children and Adolescents

Nearly 1 in 5 American children are overweight or obese. The direct costs of childhood obesity total $14.1 billion.[51] Rates of childhood obesity are increasing, and obese children become obese adults.[52,53] Current rates of adolescent obesity are projected to incur $45 billion in obesity-related spending among adults aged 35 to 64 between 2020 and 2050.[54]

ESTIMATED SAVINGS: MEDICAL WEIGHT LOSS

Key Points

- Reducing obesity rates by 1% could save $9.5 billion per year.
- Reducing the average adult BMI by 5% could save $29.8 billion in 5 years, $158 billion in 10 years, and $611.7 billion in 20 years.

Obesity increases the risk for costly chronic diseases that often require life-long treatment. Weight loss is one of the most cost-effective strategies for lowering weight-related health care costs.[20,55] A 5% to 10% weight loss significantly reduces the risk associated with obesity-related chronic diseases. It is estimated that each 1

point increase in BMI increases medical costs and pharmaceutical costs by 4% and 7%, respectively.[8] Reduction of obesity by as little as 1% from 2030 forecasts could result in nearly 3 million fewer obese adults and cost-savings of $9.5 billion per year. Reducing the average adult BMI by 5% could save $29.8 billion in 5 years, $158 billion in 10 years, and $611.7 billion in 20 years.[8] The medical savings from 10% weight reduction among obese adults aged 35 to 64 has the potential for lifetime savings on medical care for 5 common obesity comorbidities of $2200 to $5300 per person (equivalent to $3100–$7400 per person in 2013 dollars).[56,57]

SOLUTIONS: FROM PRACTICE TO POLICY

Key Points

- The best chance of reducing costs associated with obesity is with prevention programs and policy change.
- The top 3 cost-saving interventions are environmental (including tax on unhealthy foods and beverages); reduced advertising of unhealthy foods and beverages to children; and modifying nutrition labeling.
- Successful weight-reduction programs could yield net cost-savings of more than $610 billion in 20 years.
- Implementation of selective food taxes could yield medical savings of more than $17 billion.

Primary disease prevention is historically the most cost-effective means to improve health outcomes.[58] The Australian Assessing Cost-Effectiveness trials in obesity[59] and prevention[60] show several (but not all) primary preventive interventions to be cost-effective in the long term for children and adults. One leading intervention was environmental changes,[61] which included taxation of unhealthy foods and beverages. The other leading interventions included reduced advertising of unhealthy foods and beverages to children and modifying nutrition labeling using a traffic light model to delineate foods that can be eaten in moderation from foods that can be consumed ad libitum.[59,60] The most cost-effective nonsurgical strategies for weight loss in the United States (as of 2014 market prices) are Weight Watchers (compared with Jenny Craig and Vtrim) and Qsymia (compared with Lorcaserin and Orlistat).[62] Despite the evidence for these cost-effective programs, only about 4 cents of every dollar spent on health care in the United States goes toward public health and prevention.[63]

Interventions within individual providers offices range from providing patients written prescriptions that emphasize healthy eating habits, regular physical activity, and adequate sleep, to referring patients to health management programs or community resources, such as local YMCA (Young Men's Christian Association) chapters or nutrition counseling. Broader social and policy-based initiatives focus on making healthy, affordable food accessible in all communities, ensuring healthy food and beverage marketing practices.

Historically, regulatory requirements constrain insurers from paying for programs that are not directly delivered by physicians or other licensed medical providers. Traditional fee-for-service models discourage the use of nonclinical resources, including community health workers and counselors. With recent changes in health care reform, multiple public and private insurers have increased coverage for proven community-based programs[50] to reduce obesity rates. The Affordable Care Act (ACA) has led to a proliferation of community programs and workplace incentives to promote weight loss.

Such community-based strategies can be effective. A recent study showed a return of $5.60 for every $1 invested in proven community-based programs to promote

physical activity, improve nutrition, and prevent tobacco use. This program netted annual cost-savings of $16 billion annually within 5 years.[64] The ACA encourages Medicare and Medicaid enrollees to engage in weight management programs with their primary care medical homes, potentially making the provider a powerful purveyor of information on cost-savings for the obese patient. Offering covered preventive medical treatment for obesity could improve health care costs and decrease the risk of chronic diseases associated with obesity. If successful, Medicare savings could exceed $5 billion; Medicaid savings could approach $2 billion, and private payers could save $9 billion.[58]

Policy Limitations

Policy is a faster way to enact changes than grassroots prevention programs. Implementation of such programs entails skills training, service infrastructure, and funding.[5] Program-based interventions may have the benefit of being effective or may just provide the opportunity for education. Policy, once enacted, is often more sustainable and less reliant on ongoing support funding.

The American Medical Association (AMA) officially recognized obesity as a disease in 2013, noting its commitment to reducing "the incidence of cardiovascular disease and type 2 diabetes, which are often linked to obesity."[65] According to the ACA, no plan can discriminate based on a medical condition. Medical coverage for obesity is not available in all states, which may make individuals less likely to seek treatment from a health care professional.[66]

Food Taxes and Subsidies

One policy change that has been proposed is a specific food tax. Economists estimate implementation of food taxes would yield medical savings of more than $17 billion. As an example, sugar-sweetened beverages (eg, soda, sweetened teas, sports drinks) are the largest source of excess calories and added sugar[67–69] and perhaps the single largest environmental driver of obesity.[70,71] Sugar-sweetened beverage consumption (around 45 gallons per person in the United States annually) contributes roughly 70,000 additional empty calories to the typical American diet. One model[72] proposes that a nationwide penny-per-ounce excise tax on sugar-sweetened beverages would reduce consumption of sugar-sweetened beverages by 15% among adults aged 25 to 64.[72] This tax could prevent 2.4 million person-years of diabetes, 95,000 coronary heart events, 8000 strokes, and 26,000 premature deaths over the course of a decade. In addition to $13 billion in tax revenue, there would be an additional $17 billion in medical cost-savings.

In isolation, targeted food taxes and subsidies are not likely to drastically change weight outcomes; however, altering food pricing and tax structures represents one potential approach to modifying the obesogenic food environment in modern America.

SUMMARY

Obesity affects individual patients and society alike. Obesity imposes significant external costs on society through health care expenses. Externalities associated with the current obesity epidemic merit appropriate public interventions and policy change. Addressing the negative health effects of secondhand smoke is a reasonable template of externalities with serious health impact that has been addressed successfully through programs and policy. As the number of obese Americans increases, associated health care expenditures will do the same. To meaningfully address the increase in obesity requires involvement at all levels of the health care system. Individual

providers can engage patients to reduce or eliminate intake of sugar-sweetened beverages, reduce screen time, and track food and beverage intake. Community programs, Weight Watchers, and Qysmia are cost-effective nonsurgical weight loss options, and bariatric surgery is a viable option for some obese patients. Employers, communities, and insurers can implement workplace incentives and community-based programs to promote activity and healthy eating. Early intervention is vital because obesity continues to affect growing numbers of American youth. Ultimately, broad policy changes that have long-term cost-savings and combat the negative aspects of the modern obesogenic environment are needed to affect more permanent change.

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