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Assessing the Economic Impact of Obesity and Overweight on Employers:

Identifying Paths Toward Work Force Health and Well-Being

Table of Contents

List of Exhibits

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Executive Summary

Obesity is a major public health challenge with profound implications for employers. We estimate that approximately 30% of working adults are classified as having obesity (BMI 30.0 or higher) and 34% meet the criteria for overweight (BMI 25.0 to less than 30.0).[1] Excess body weight is strongly linked to a heightened risk of chronic disease, including heart disease, type 2 diabetes, hypertension, certain cancers, and other health conditions.[2–6] Furthermore, obesity has been associated with a greater susceptibility to severe influenza and COVID-19.[7–9] These health problems contribute to increased healthcare and disability expenses[10–14], more days of work missed due to illness or injury[12–17], and diminished workforce productivity.[17,18] The health consequences of obesity contribute to lower levels of employment and premature mortality, leading to a diminished labor force.[19–23] For occupations that are physically demanding, the fitness challenges associated with obesity and associated morbidity can lead to a smaller recruiting pool.[24,25]

The economic implications of obesity to employers can differ widely across industries and geographic regions. We estimate that obesity rates range from a low of 22% in the Professional and Business Services sector to a high of 38% in the Mining sector. Moreover, regional variations are substantial, with obesity rates for adults ranging from a low of 24% in Washington, D.C. to a high of 41% in West Virginia.[26] Considering this interplay between industry and geographical distinctions, worker demographics, wages, healthcare costs, and other economic factors such as injury or disability risk and employee turnover, the existing research on the implications of obesity can be complex for employers to navigate when making crucial decisions regarding obesity in the workforce.

Therefore, the primary objective of this study is to quantitatively assess the workforce and economic consequences of excess body weight from the employer's perspective, including an assessment by economic sector. Our aim is to provide employers with comprehensive insights, enabling them to make informed and impactful decisions concerning obesity in the workplace. Findings regarding the impact of overweight in the workforce also are presented.

Key findings for 2023 include:

- Of the 158 million civilian employees on nonfarm payrolls, 30% (46.9M) had obesity and 34% (53.8M) had overweight.
- Employers and employees experienced $425.5 billion in negative economic effects attributed to obesity ($347.5B) and overweight ($78B).
    - $6,472 per worker with obesity
    - $1,244 per worker with overweight
    - $1,514 per covered adult dependent with obesity and $380 per adult dependent with overweight

Obesity and overweight in the nonfarm, civilian workforce cost about $425.5 billion in 2023:

- **$146.5 billion in higher medical costs to employers ($89.8B) and employees ($56.7B), associated with obesity ($115B) and overweight ($31.5B)**
- **$31.1 billion in higher disability payments**
- **$5.2 billion in higher Workers' Compensation Program costs**
- **$82.3 billion in higher health-related work absenteeism associated with obesity**
- **$160.3 billion in higher health-related presenteeism associated with obesity ($113.8B) and overweight ($46.5B)**

$6,472 annual cost per worker with obesity includes:

- **$1,514 higher medical costs**
- **$664 higher disability costs**
- **$112 higher injury worker compensation**
- **$1,755 higher absenteeism costs**
- **$2,427 higher presenteeism costs**

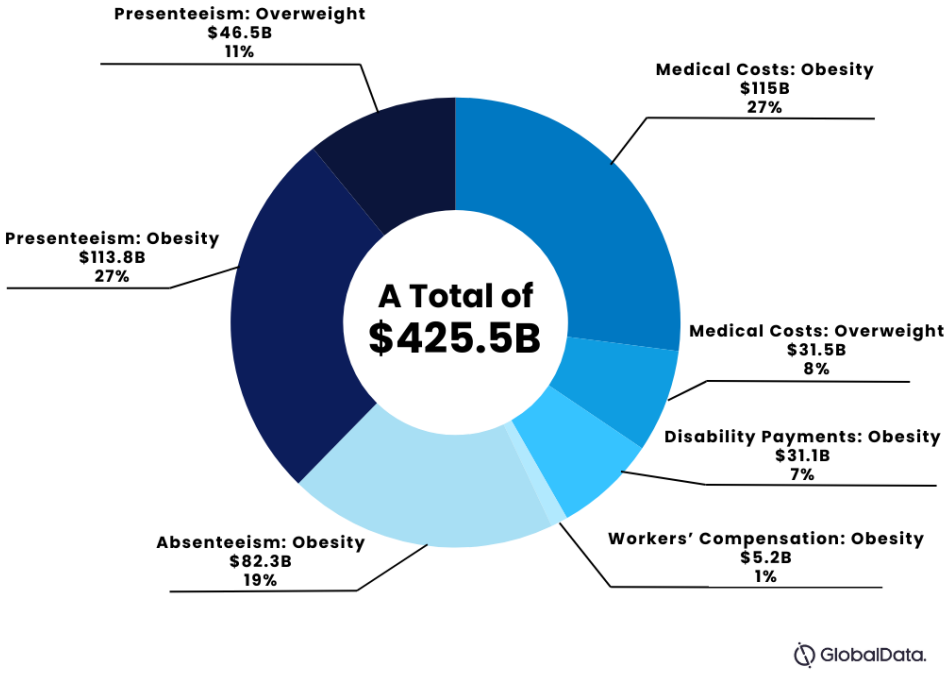
- Of the $146.5 billion in higher medical costs for obesity ($115B) and overweight ($31.5B), employers incurred $89.8 billion and employees incurred $56.7 billion.
    - Workers with obesity and overweight experienced higher annual medical costs of, respectively $1,514 and $380. For modeling, we assume that adult dependents with obesity and overweight experience higher annual medical costs similar to their employed spouse or partner.
- Obesity and overweight are associated with reduced productivity. At the national level, this amounts to -
    - $31.1 billion in higher disability payments by employers, or $664 per worker with obesity
    - $5.2 billion in higher Workers' Compensation Program costs, or $112 per worker with obesity
    - $82.3 billion in higher health-related work absenteeism, or $1,755 per worker with obesity
    - $160.3 billion in higher health-related presenteeism associated with obesity ($113.8B, or $2,427 per worker with obesity) and with overweight ($46.5B, or $864 per worker with overweight)
- The study estimated the economic implications of excess body weight in 2023 for select industries[a] -
    - $85.3 billion in the Government sector associated with obesity ($74.7B) and overweight ($10.6B)
    - $78.6 billion in the Education and Health Services sector associated with obesity ($63.6) and overweight ($14.9B)
    - $45.1 billion in the Professional and Business Services sector associated with obesity ($32.3B) and overweight ($12.8B)
    - $44.5 billion in the Manufacturing sector associated with obesity ($36.5B) and overweight ($8.1B)
    - $24.1 billion in the Financial Activities sector associated with obesity ($21B) and overweight ($3.1B)
    - $24 billion in the Transportation and Utilities sector associated with obesity ($20.5B) and overweight ($3.5B)
    - $22.1 billion in the Construction sector associated with obesity ($20B) and overweight ($2.1B)
- Large employers typically have more generous healthcare benefits, and we modeled the annual cost of obesity and overweight for a hypothetical employer of 10,000 employees plus their covered adult dependents. Across seven major industry sectors analyzed, the annual cost of obesity and overweight per organization with 10,000 employees ranged from a low of $19.4 million for the Professional and Business Services sector, to a high of $36.7 million in the Government sector. Contributors to differences between these two industries include: obesity prevalence (22% vs 36%), additional costs per worker with obesity for medical care ($1,588 vs. $1,751), disability insurance payments ($196 vs $913), Workers' Compensation Program payments ($33 vs $154), absenteeism ($1,518 vs $2,226), and obesity-associated presenteeism ($1,987 vs $2,840).

The largest economic costs are associated with higher medical costs, presenteeism, and absenteeism associated with obesity (Exhibit ES-1). Of the costs associated with excess weight, 43% are direct costs (medical costs, disability payments,

[a] Obesity and overweight numbers might not precisely sum to the total because of rounding.

and workers compensation payments) and 57% are indirect costs (absenteeism and presenteeism). Obesity accounts for 82% and overweight accounts for 18% of total estimated costs.

Exhibit ES- 1. Cost Implications of Obesity and Overweight: All Nonfarm Civilian Workforce, 2023 ($Billions)



Evidence-based approaches to treat obesity include intensive lifestyle modification programs such as the Diabetes Prevention Program[22], and medical interventions such as anti-obesity medications (AOMs) and metabolic/bariatric surgery. The cornerstone of obesity treatment is intensive lifestyle modification programs, with studies showing average weight loss up to 8% of initial body weight.[23,24] Medical treatments may be necessary for individuals with obesity who have not achieved sufficient weight loss through intensive lifestyle interventions and behavior modifications alone. Medical treatments may be part of initial therapy based on the health care professional's assessment. Studies indicate that patients who combine AOMs that have been on the market for several years with lifestyle interventions achieve weight loss that is 3% to 12% higher compared to patients not using such medications.[25] Recent clinical trials with newer AOMs, or Glucagon-like peptide-1 receptor agonists (also known as GLP-1 receptor agonists), have reported average weight loss of 15% to 20%, or even higher in many patients.[26–29] Different types of metabolic/bariatric procedures have been associated with an average weight loss of 25% or higher.[30,31]

We simulated the value of obesity treatment for a representative sample of the workforce with obesity in each of the modeled industries. Scenarios modeled the reduced incidence of disease and estimated medical savings associated with achieving and maintaining weight loss ranging from 5% up to 25%.

- Under the least aggressive (5%) weight loss scenario, 22% of people with obesity would no longer meet the criteria for obesity. In the most aggressive (up to 25%) weight loss scenario, this percentage increases to 78%.
- Under the 25% weight loss scenario, over 5 years the estimated incidence of new cases of type 2 diabetes, stroke, heart attack, heart disease, and mortality would decline by 38%, 26%, 25%, 20%, and 8%, respectively.
- With sustained 25% weight loss, medical costs may decline by a cumulative average of $4,830 per person with obesity over 5 years and $13,510 over 10 years. For people with class III obesity, estimated cumulative savings is

$7,950 over 5 years and $21,980 over 10 years. For an employer with 10,000 workers, maintaining 25% weight loss over 5 years would equate to $20.6 million in potential medical savings among employees ($14.3M) and covered adult dependents plus ($6.3M) excluding the cost of intervention to achieve weight loss.

This study investigates the implications of obesity from the perspective of employers. However, there are additional implications of obesity for the workforce and their insured dependents that have implications for employee well-being. Many of these effects are difficult to quantify in monetary terms, but nonetheless are expected to affect employee morale and employers' corporate social responsibility (CSR) and sustainability initiatives. We discuss these implications below.

There is substantial evidence to supporting the notion that healthy and happy employees tend to be more productive.[27–29] Research in the fields of psychology, management, and organizational behavior has consistently shown a positive correlation between employee well-being and productivity. Studies have found that employees who report higher levels of job satisfaction are more productive. They tend to be more engaged in their work, show higher levels of commitment to their organizations, and put in greater effort to achieve their goals. Positive emotions, including happiness, have been linked to improved cognitive abilities such as creativity, problem-solving, and decision-making. Happy employees are more likely to approach tasks with a constructive and innovative mindset, and tend to produce higher quality work. They are more attentive to detail and less prone to errors. High job satisfaction and happiness at work are associated with lower turnover rates thus saving resources that would otherwise be spent on recruiting, onboarding, and training new employees.

Our analysis that compares rates of absenteeism and presenteeism for people with obesity compared to people with healthy weight presumably captures some of the above potential implications of treating obesity. Other considerations include the following:

- **Stigma and discrimination**: People with obesity encounter stigma, bias, and discrimination in various aspects of life, including education, employment, healthcare, and relationships.[30–32] These negative experiences may lead to reduced self-confidence and restricted opportunities for social and professional advancement.

- **Health complications, quality of life, and early mortality**: Obesity and its related health conditions can significantly impact mobility, physical functioning, mental health, and engagement in daily activities, hobbies, and social events.[33,34] This may result in pain, discomfort, and limitations in daily functioning, leading to a diminished quality of life. Additionally, obesity is associated with a higher risk of premature mortality.[8,9,21]

- **Equity concerns**: Obesity disproportionately affects women, racial/ethnic minorities, and individuals with lower educational attainment and earnings, exacerbating existing income and health disparities within society.[35–37]

- **Reduced workforce resilience**: Obesity reduces the available workforce as some jobs have specific weight or physical fitness requirements due to safety concerns or performance expectations.[38] Other jobs require high levels of physical exertion, and obesity can limit mobility, stamina, and overall physical performance, making it more challenging to meet the physical demands of these jobs. This can lead to decreased work efficiency, increased fatigue, and a higher risk of work-related injuries. People with obesity-related comorbidities have experienced greater severity of COVID-19 effects including mortality, making workers and their employers more susceptible to health crises such as the pandemic.[8,9]

The study findings highlight the significant economic repercussions of obesity for businesses and their employees. They underscore the need to address obesity as a public health concern and to deploy effective prevention and treatment strategies to alleviate its adverse impacts on health, well-being, and the economy. Prioritizing initiatives to combat obesity can enhance individual well-being, promote greater societal equity, and cultivate a healthier workforce.

Recommendations

Prominent organizations have released evidence-based guidelines that provide valuable guidance concerning the prevention and treatment of obesity.[39–52] Still, access to and utilization of obesity treatment remains limited. Employers are

an important stakeholder in addressing obesity as a large portion of the population has medical insurance through employer-sponsored plans, obesity directly affects workforce productivity and employer profitability, and many workers spend a substantial portion of their time at employer facilities or engaged in work activities. The following recommendations to employers can increase access to modernized[b] and evidence-based obesity care for employees and covered family members.

1. **Opt-in to comprehensive obesity insurance coverage and wellness programs for obesity care at parity with other chronic diseases**: In line with national recommendations, employers can ensure their health insurance plans cover evidence-based obesity treatments, including intensive behavioral counseling[53], nutrition support[54], pharmacotherapy[44], and metabolic/bariatric surgery[45].

2. **Upgrade, implement, or incent use of wellness programs**: Employers can implement wellness programs that specifically address obesity prevention and management.[54–56] These programs can include resources for healthy eating, physical activity initiatives, and access to fitness facilities or classes. For example, a targeted obesity intervention through the Diabetes Prevention Program Lifestyle Core Curriculum offered at the worksite showed a median 2.5% decline in body weight over 16 weeks.[57]

3. **Foster a culture of support and inclusion**: Employers can create a culture of support and inclusion that recognizes and accommodates the needs of employees with obesity. This can involve implementing non-discriminatory policies, offering weight bias and stigma training, creating a supportive workplace environment that promotes healthy behaviors such as providing healthy food options, offering opportunities for physical activity, and providing reasonable workplace accommodations for individuals with obesity and related health conditions.

4. **Provide education and resources**: Employers can provide education and resources to employees to educate about the health risks associated with obesity as well as strategies for obesity care and weight management. This can include partnering with their health insurance program and other providers to encourage weight assessments as part of their annual physical, and offer health screenings, health coaching, and other support services.

These recommendations not only address the health and well-being of employees and their families, but also contribute to a more inclusive and supportive work environment. They can help reduce the impact of obesity on the workforce and improve overall workplace productivity and job satisfaction. Additionally, these steps align with modern principles of employee well-being and contribute to a positive organizational culture.

In summary, in 2023, obesity and overweight are associated with **$425.5 billion in economic costs to employers and employees**, this includes **$146.5 billion in higher medical costs**, **$82.3 billion in higher absenteeism**, **$160.3 billion in higher presenteeism, $31.1 billion in higher disability costs, and $5.2 billion in higher Workers' Compensation Program costs.** The impacts vary by industry. For a typical employer of 10,000 employees, the cost to employers and employees ranges from $19.4 million in the Professional & Business Services sector to $36.7 million in the Government sector. Providing support for employees and their dependents in managing obesity offers significant economic benefits for employers and their workforce, while also delivering substantial societal gains. Investing in obesity treatment enhances employee well-being, productivity, and fosters a healthier, more prosperous society.

[b] Modern healthcare leverages science, technology, health capabilities, and cost-effective solutions to enhance quality, efficiency, and delivery of care.

Background

The nation's obesity crisis places a significant economic burden on employers, raising the cost of producing goods and services while reducing overall productivity. In October 2023, there were an estimated 169.3 million people employed in the U.S, of which 158 million were civilian employees on nonfarm payrolls and who are the focus of this analysis.[58] Our analysis of the National Health Interview Survey (NHIS) suggests that of these 158 million employees, 46.9 million (30%) had obesity and 53.8 million (34%) had overweight.[1] Excess body weight is strongly linked to a heightened risk of chronic disease, including heart disease, type 2 diabetes, hypertension, certain types of cancer, and other health conditions.[2–6] Furthermore, obesity has been associated with a greater susceptibility to severe influenza and COVID-19.[7–9]

These health problems contribute to increased healthcare and disability expenses[10–14], more days of work missed due to illness or injury[12–17], and diminished workforce productivity.[17,18] The health consequences of obesity contribute to lower levels of employment and premature mortality, leading to a diminished labor force.[19–23] For occupations that are physically demanding, the fitness challenges associated with obesity and associated morbidity can lead to a smaller recruiting pool.[24,25]

Studies demonstrate the substantial economic impact of obesity on a national scale, with estimated direct and indirect costs accounting for 2.0% to 3.3% of the U.S. gross domestic product (GDP).[59,60] Recent state-level studies estimate that obesity lowered state GDP by between 1.7% to 2.6% in addition to redirecting spending to healthcare that could have otherwise been invested in other areas.[61]

While many studies have explored individual economic components of obesity, comprehensive assessments from the employer's perspective on the economic costs of obesity and the value of prevention and treatment are limited. Amidst the shared responsibility to address obesity, employers play a crucial role due to several factors:

1. **Financial incentives**: Employers strongly influence healthcare access and financing through employer-sponsored medical insurance plans, leading to a vested interest in tackling the high medical costs associated with obesity and its comorbid conditions. Addressing preventable or treatable health conditions can also mitigate productivity losses among employees, offering further financial incentives.

2. **Access to employees**: With daily access to their workforce, employers are well-positioned to implement workplace wellness programs and initiatives focused on promoting healthy lifestyles and weight management. Customized obesity prevention and intervention programs can be tailored to suit the specific needs of employees.

3. **Influence on workplace culture and work environment**: Employers have the power to create a supportive work environment that encourages healthy behaviors. By providing healthy food options, promoting physical activity, and offering wellness resources to employees and their dependents, employers can foster employee well-being, ultimately boosting morale, engagement, productivity, and reducing turnover.[62–64]

The workforce exhibits significant heterogeneity, leading to geographic, industry-specific, and worker-characteristic variations in the economic implications of obesity and its solutions. The prevalence of obesity varies by industry due to demographics, socioeconomic factors, and job-specific characteristics. Our analysis of major industry categories finds that the proportion of workers with obesity ranges from a low of 22% in the Professional and Business Services sector to a high of 38% in the Mining sector. Moreover, regional variations in obesity among adults is substantial, ranging from a low of 24% in Washington, D.C. to a high of 41% in West Virginia.[26] Considering this interplay between industry and geographical distinctions, worker demographics, wages, healthcare costs, and other economic factors such as injury or disability risk and employee turnover, existing research on obesity's implications becomes a complex landscape for employers to navigate when making crucial decisions regarding obesity in the workforce.

Therefore, the primary objective of this study is a quantitative assessment of the workforce and economic repercussions of obesity from the employer's standpoint. Our goal is to equip employers with comprehensive insights, empowering them to make well-informed decisions on managing obesity in the workplace. Taking proactive measures to address obesity and enhance workforce health not only positions employers to elevate their economic competitiveness but also cultivates a thriving and productive work environment. The findings also extend to the impact of overweight in the workforce. We present data at the national level, per employee with obesity and with overweight, and for a hypothetical nationally representative employer with 10,000 employees. Furthermore, detailed estimates for seven economic sectors (construction, education and health, financial activities, government, manufacturing, professional and business services, and transportation and utilities) are available in the appendices. An additional appendix delves into state variations in the cost of obesity to employers.

Economic and Workforce Implications of Excess Weight

A healthy population is vital for driving economic growth as it expands the labor force, enhances productivity, reduces absenteeism and turnover, and allows for resources otherwise spent on healthcare to be allocated to other productive activities. A healthy and productive workforce creates an appealing business environment for investment, attracting companies that value access to skilled workers, increased productivity, and lower healthcare expenses.

The cost burden of obesity on employers and employees varies across industries and occupations, yet existing research offers limited insight into the underlying reasons for this variation.[12,18] In this section, we explore the prevalence of obesity and overweight among the workforce, higher medical costs associated with excess body weight, and the other direct and indirect costs to employers and their workforce.

Prevalence of Obesity and Overweight

Using the National Health Interview Survey (NHIS), we estimated the prevalence of obesity and overweight by employment status, industry, and occupation. NHIS is an annual survey of households sponsored by the National Center for Health Statistics. The survey collects self-reported information on body weight and height, which is used to calculate body mass index (BMI). Self-reported height and weight can lead to a systematic misclassification of BMI categories, coupled with the inherent skewness of BMI distributions, which may result in underestimation of obesity prevalence.[65] Healthy weight for adults is defined as having a BMI between 18.5 to <25.0 kg/m^2; overweight is defined as BMI between 25.0 to <30.0 kg/m^2, and obesity is defined as BMI of 30.0 kg/m^2 or higher.[1] While BMI is widely used, it is an imperfect measure of body fat, primarily assessing excess body weight rather than fat specifically.[66] This nuance is particularly relevant when examining overweight and obesity prevalence across industries and occupations. Physically demanding jobs may involve individuals with higher bone density and muscle mass, potentially leading to misclassification into higher weight categories. However, despite its limitations, BMI remains a readily available metric that, at the population level, serves as a robust predictor of various health and economic outcomes.

Analyzing NHIS data spanning the years 2015 to 2018 (the most recent period for which industry-specific data is available), we derived estimates for the prevalence of obesity and overweight across detailed industries in the NHIS (Exhibit 1). Of the 169.3 million people employed in October 2023, an estimated 50.4 million (30%) had obesity and 59.7 million (34%) had overweight. Obesity prevalence is highest in the mining industry (38%) and lowest in the professional & business services industry (22%). Due to data limitations, our focus is the 158 million civilian employees on nonfarm payrolls of whom 46.9 million have obesity and 53.8 million have overweight. The observed variation across industries is linked in part to differences in demographics and socioeconomic characteristics.[67] Other contributors likely include differences in physical

activity levels associated with one's job, and other job-related characteristics including workplace environment, stress levels, and work schedule.[68]

Exhibit 1. Obesity and Overweight Prevalence by Detailed Industry

	Prevalence Rate [a]		Employment, 2023 [b]		
NHIS Industry	Obesity	Overweight	Total	With Obesity	With Overweight
Accommodation & Food Services	24%	30%	16,677,000	4,086,000	4,964,000
Agriculture, Forestry, Fishing, & Hunting	33%	41%	2,179,000	724,000	891,000
Construction	32%	43%	8,193,000	2,629,000	3,491,000
Education Services	28%	30%	4,111,000	1,134,000	1,242,000
Finance & Insurance	29%	35%	9,178,000	2,707,000	3,240,000
Health Care & Social Assistance	32%	31%	21,798,000	6,940,000	6,656,000
Information	29%	34%	3,037,000	874,000	1,042,000
Manufacturing	33%	37%	12,961,000	4,236,000	4,837,000
Mining	38%	36%	651,000	249,000	233,000
Non-Agriculture Self-Employed	NA	NA	9,126,000	2,708,000 [c]	3,109,000 [c]
Other Services	27%	32%	5,890,000	1,610,000	1,876,000
Professional, Scientific, & Technical Services	22%	35%	23,287,000	5,109,000	8,146,000
Public Administration	36%	36%	23,243,000	8,337,000	8,337,000
Retail Trade	29%	33%	15,563,000	4,572,000	5,168,000
Transportation & Warehousing	37%	37%	6,735,000	2,461,000	2,524,000
Utilities	33%	45%	561,000	187,000	252,000
Wholesale Trade	31%	39%	6,099,000	1,876,000	2,370,000
All Industries	30%	34%	169,289,000	50,440,000	59,732,000

Notes: [a] Estimated using the 2015-2018 National Health Interview Survey. [b] October 2023 employment estimates. https://www.bls.gov/news.release/empsit.t17.htm [c] Obesity and overweight prevalence is unavailable for the non-agriculture self-employed workforce, so estimates here are extrapolated using the obesity and overweight prevalence estimates for all industries.

Industry category names and details may vary across data sources, but the North American Industry Classification System (NAICS) serves as a standard framework for supersectors, sectors, and industries.[69] Hence, within this report, industry and sector names may vary depending on the data source. For instance, the Education Services industry and the Health Care & Social Assistance industry in Exhibit 1 are combined into the Education & Health Services industry or the Education, Health & Social Services industry in subsequent exhibits. This alignment with naming conventions from other government sources ensures consistency with the main data sources utilized in this analysis and the seven industry sectors highlighted in the appendices.

The prevalence of obesity (Exhibit 2) and overweight (Exhibit 3) varies by occupation group across a subset of industries that are discussed in more detail in the appendices. As with observed variation across industries, this variation across occupations likely is linked to differences in demographics, socioeconomic characteristics, physical activity levels associated with one's job, and other job-related characteristics including workplace environment, stress levels, and work schedule.[68] Within the occupation categories where we conducted more in-depth analysis, obesity is particularly prevalent among transportation and material moving workers (40%).

Exhibit 2. Obesity Prevalence by Employee Industry and Occupation

Industry \ Occupation	Business & Financial Operations	Community & Social Services	Computer & Mathematical	Construction	Education & Health Services	Management	Office & Administrative Support	Production	Sales & Related	Transportation & Material Moving	All Occupations
Construction	25%			32%		31%	34%				32%
Education & Health Services	29%				26%	29%	35%				31%
Financial Activities	29%					25%	38%		28%		29%
Government	32%	44%				32%	38%				36%
Manufacturing	24%					27%	35%	36%			33%
Professional & Business Services	23%		21%			19%	29%				22%
Transportation & Utilities	29%					28%	34%			41%	36%
All Industries	**27%**	**35%**	**25%**	**34%**	**27%**	**28%**	**34%**	**36%**	**28%**	**40%**	**30%**

Notes: Estimated using the 2015-2018 National Health Interview Survey.

Exhibit 3. Overweight Prevalence by Employee Industry and Occupation

Industry \ Occupation	Business & Financial Operations	Community & Social Services	Computer & Mathematical	Construction	Education & Health Services	Management	Office & Administrative Support	Production	Sales & Related	Transportation & Material Moving	All Occupations
Construction	37%			43%		43%	34%				43%
Education & Health Services	27%				31%	35%	27%				30%
Financial Activities	38%					39%	26%		40%		35%
Government	35%	30%				35%	32%				36%
Manufacturing	37%					41%	33%	36%			37%
Professional & Business Services	33%		40%			38%	29%				35%
Transportation & Utilities	37%					49%	35%			39%	38%
All Industries	**34%**	**30%**	**37%**	**42%**	**30%**	**38%**	**30%**	**42%**	**36%**	**36%**	**34%**

Notes: Estimated using the 2015-2018 National Health Interview Survey.

Little is known about the obesity and overweight status of adult dependents of employees. Many of these adult dependents are in the workforce, while others are not. For modeling, we assume that the body weight status of covered adult

dependents is the same as the employee. Research finds a strong correlation between couples in their obesity status and in the likelihood of obesity onset.[70,71]

Healthcare Costs

Obesity is a major risk factor for chronic diseases and for severity of acute conditions such as COVID-19 and influenza.[2–9] These conditions often necessitate ongoing medical care, medications, and treatments, contributing to higher healthcare expenses.[5,10,12] To estimate the increased healthcare costs associated with obesity and overweight, we used a two-step process involving logistic regression and a generalized linear model with a log link[5,72] applied to the 2018-2021 files of the Medical Expenditure Panel Survey (MEPS). Analysis of annual medical expenditures is complicated by the skewed nature of the data, with many individuals having zero annual expenditures and some individuals having very large expenditures. The dependent variable was annual medical expenditures scaled to 2023 dollars using the medical component of the Consumer Price Index. The explanatory variables were body weight category (healthy, overweight, obesity), age group, gender, race, Hispanic ethnicity, and year. The analysis excluded women who had a pregnancy or child birth during the year.

On average, the employed population with obesity incurs approximately $1,514 more in annual medical expenditures than would be expected if this population had a healthy weight (Exhibit 4). Overweight is associated with an average increase of $380 in annual medical expenditures. The additional medical costs per employee with obesity varies across MEPS industry categories, ranging from $2,058 for Mining to $1,182 for Natural Resources. Analyzed medical costs omit purchases of over-the-counter health-related purchases not typically covered by medical insurance.

MEPS collects medical expenditure data on only one person in the household, and thus is of limited use for estimating the impact of obesity on adult dependents of employees. The 2015 and 2016 MEPS files do allow one to identify whether a person has commercial insurance through another family member, but do not identify the industry of the family member through whom employment is obtained. Many of these adult dependents are in the workforce themselves, and adult dependents not in the workforce have significantly higher annual medical expenditures compared to similar adults in the workforce. For modeling, we use the industry-average increase in medical expenditures associated with obesity and overweight estimated for employees as a proxy for the increase in medical expenditures for adult dependents with obesity and overweight. Research finds that married couples and domestic partners share many of the same disease risk factors and behaviors (e.g., smoking, diet, and physical activity level).[73,74] Married couples and domestic partners generally have similar socioeconomic characteristics and share the same healthcare plan.

For contextual comparison, studies have reported estimates of the annual additional medical costs attributed to obesity ($1,612[6], $2,438[10], and $4,231[11]) and overweight ($224[6]) in 2023 dollars among adults with private insurance. Other studies have reported estimates of the additional cost of obesity ($2,055[5], $2,593[75]) and overweight ($400[75]) among all adults when scaled to 2023 dollars. That our estimate of the additional medical costs of obesity ($1,514) is on the lower end of published studies is unsurprising, as people with obesity who are in the workforce are likely to have fewer obesity-related comorbid conditions relative to people with obesity who are not in the workforce. Using the cost of obesity for employed adults as a proxy for costs among adult dependents with obesity is likely conservative.

Exhibit 4. Estimated Annual Medical Costs Attributed to Obesity and Overweight for Employed Individuals and Adult Dependents

Industry	Obesity	Overweight
Construction	$1,478	$416
Education, Health & Social Services	$1,639	$447
Financial Activities	$1,405	$316
Information	$1,615	$919
Leisure & Hospitality	$1,439	$409
Manufacturing	$1,787	$447
Mining	$2,058	$670
Natural Resources	$1,182	$176
Professional & Business Services	$1,588	$355
Public Administration	$1,751	$408
Transportation & Utilities	$1,544	$341
Wholesale & Retail Trade	$1,355	$422
All Industries	**$1,514**	**$380**

Notes: Analysis of industry categories in the 2018-2021 Medical Expenditure Panel Survey. Estimates in 2023 dollars.

To estimate the implications of higher medical costs on employers and employees, the following data and assumptions are included in the calculations.

- We model that the proportion of medical insurance premiums paid by employers varies by industry. For single coverage, the percentage of premiums paid by the employer ranges from a high of 88% for Government employees to a low of 78% for workers in goods-producing industries.[76] For family coverage, the high is 78% for Government employees and the low is 66% in the Education and Health Services industries. The proportion of premium costs paid by the employer in larger employers (>500 employees) is about 6% higher than the industry average for family coverage and about 3% higher for single coverage.[76] Data are unavailable on the proportion of employees with overweight or obesity who have single versus family coverage, so for modeling we average the proportions for single and family coverage for each industry.

- Independent of the employee and employer contributions to medical insurance premiums, employees pay a portion of medical expenditures in the form of deductibles, copays, and co-insurance. Analysis of the MEPS indicates that overall, employees with commercial insurance pay approximately 18.8% of medical costs out-of-pocket. This ranges from a high of 25.4% for people in the Leisure and Hospitality sector, to a low of 15.1% in the Government sector.

- Factoring in the proportion of medical expenditures that employees pay for out-of-pocket expenses and employee's share of insurance premiums, we estimate that across industries about 60.1% of medical costs are paid by the employer with the remaining 39.9% paid by the employee. The percentage of total medical costs paid by the employer ranges from a high of 70.5% for the Government sector to a low of 55% for the Construction sector.

- Not all employees will choose their employer's health plan, as some employees might elect to receive coverage through the insurance plan of another family member. An estimated 62% of adults are married or have a partner[77], and an estimated 29% of couples have separate insurance coverage.[78] Combining these numbers, we estimate that 44% of insured employees will have an adult dependent covered under their insurance plan, while 18% of employees will have an adult dependent covered under other insurance plan.

Although we do not explicitly model the economic implications of obesity by employee union status, the rate of union representation varies by industry.[79] Healthcare benefits are one of the primary components of union membership, which

increases the likelihood of employees utilizing medical services. Typically, union members are more likely to visit a regular healthcare provider and experience lower out-of-pocket costs for healthcare expenditures.[80] Unionized employees have 96% more access to healthcare benefits compared to non-unionized employees, who have a 69% access rate.[80] The monthly premium cost for family coverage per employee for union employees $487.42 and for non-union employees $655.39.[80,81]

Absenteeism

Obesity is linked to increased rates of work absenteeism due to health-related issues, resulting in both direct and indirect costs.[12–17] Direct costs comprise wages paid to absent employees, worker replacement expenses (such as overtime pay or temporary worker hiring), and administrative costs. Indirect costs include diminished team productivity, safety concerns, and lower service or product quality due to understaffing, along with potential burnout or poor morale among employees covering for an absent coworker. Overweight is weakly associated with increased absenteeism and is excluded from our cost calculations.[82–84]

Estimates of obesity-related absenteeism costs vary due to study differences in data sources, methods, and assumptions.[17] A 2021 study based on analysis of the 2001 to 2016 MEPS estimates that obesity, relative to healthy weight, increases annual missed work days due to injury or illness by 3.0 days.[15] Calculating the lost productivity due to obesity, valued at 50% or 100% of average daily earnings, the authors estimate an annual cost per employee with obesity ranging from $271 to $542 in 2016 (or $344 to $689 in 2023 dollars). A 2023 study, examining MarketScan data on 719,482 employees with and without obesity between January 2015 and December 2019, estimates that obesity raises annual absenteeism costs by $891 (reaching $1,036 for employees with class 3 obesity) relative to employees with healthy weight.[13,14] Notably, these estimates consider only employee wages when calculating the productivity cost of missed work days.

Previous studies have suggested the use of wage multipliers to estimate the total economic cost of absenteeism from the employer's perspective.[16,85–87] This wage multiplier accounts not only for the immediate financial loss associated with absenteeism but also extends its scope to encompass broader repercussions within the organization, including factors such as team cohesion, knowledge transfer, and project continuity. In alignment with a recent study, our model employs a wage multiplier of 1.97 times the average wage to estimate productivity loss due to absenteeism.[16] The $891 average, annual cost of obesity-associated absenteeism based on employee wages is the best available estimate given the large sample size and recent data source. Combined with the 1.97 wage multiplier, this suggests that the average annual cost to employers is $1,755 per person with obesity.

According to the Bureau of Labor Statistics (BLS), full-time workers averaged 2.6 missed work days in 2022 for illness or injury.[88] Across industries, the average annual number of missed work days ranged from 1.5 days for workers in the Mining sector to 3.2 days in the Public Administration sector. Across occupations, the number ranged from 1.6 days for people in management occupations to 3.9 days for people in the building and grounds cleaning and maintenance occupations. Similarly, the costs associated with obesity-related absenteeism are expected to differ by industry and occupation.

Poisson regression analysis of pooled 2017-2021 NHIS data, controlling for age group, race/ethnicity, gender, industry, and year found that obesity is associated with 3.2 extra missed work days annually due to illness or injury (relative to an employee with healthy weight). Obesity-associated missed work days varied across industries, ranging from 1.1 days in the Agriculture, Forestry, Fishing, and Hunting Industries to 4.3 days in Transportation and Warehousing Industries, Real Estate and Rental and Leasing Industries, and Public Administration Industries. Using $1,755 as the overall average annual cost per employee with obesity, and adjusting for industry variation in obesity-associated missed work days and wages, we estimated industry-specific estimates of obesity-related costs of absenteeism. Among the seven major industry sectors modeled, the estimates ranged from a low of $1,518 in the Professional & Business Services sector to high of $2,426 in the Financial Activities sector.

Presenteeism

Presenteeism is defined as employees experiencing reduced productivity due to impaired health and/or well-being. Employees with overweight, obesity, and comorbid health conditions may struggle with presenteeism at a higher rate than employees without or with lower levels of overweight, obesity and related health conditions. A study estimates that presenteeism constitutes approximately 3.7% of personnel costs[89], with health-related presenteeism imposing a much larger economic cost than absenteeism.[90] Studies show that obesity and overweight are risk factors for reduced productivity through presenteeism.[17,82–84,91] Comorbid conditions associated with obesity—such as cardiovascular and cerebrovascular diseases, depression, sleep apnea, and diabetes—also are linked to high presenteeism rates and costs.[92–95]

A 2017 review of nine studies found that presenteeism costs per worker per year ranged from -$776 to $2,020 for overweight (midpoint=$622) and from $14 to $5,304 for obesity (midpoint=$2,659), relative to a healthy weight population and adjusted to 2023 dollars.[17] A 2008 study among manufacturing employees (n=341) reported a 4.2% health-related reduction in productivity among workers with BMI≥35 (class 2 or class 3 obesity).[96] This loss was 1.18% more than other workers and equates to $743 per worker in 2023 dollars. The impact of presenteeism measured using lost employee wages will underestimate the cost to employers, as employees' diminished productivity can result in suboptimal work quality and output. As with modeling absenteeism, a wage multiplier accounts not only for the immediate financial loss associated with presenteeism but also extends to the indirect costs to employers—including factors such as team cohesion, knowledge transfer, and project continuity.[16,97] Our model employs a published wage multiplier of 1.54 times the average wage to calculate productivity cost due to presenteeism.[16]

Our analysis of NHIS data (2013-2018) found that among adults able to work, 7.7% of employees with obesity indicated that they were “somewhat limited” in the kind and amount of work they could do due to a physical, mental, or emotional problem. For comparison, 5.2% of employees with overweight and 5.0% of employees with healthy weight indicated being “somewhat limited” in their ability to work. Adjusting for demographics using logistic regression, obesity and overweight are associated with 2.6 and 0.9 percentage point increase, respectively, in employees reporting limited work productivity. The obesity impact ranges from 3.6 percentage points in the Government sector to 1.3 points in the Construction sector, while the overweight impact ranges from 1.5 points in the Education & Health Services sector to no estimated effect for the Construction sector. Translating limited work capacity into a presenteeism measure, our model uses the impacts of obesity and overweight as proxies for productivity decline, suggesting a 2.6% decrease for obesity and 0.9% for overweight. For comparison, one study estimates diabetes-attributable presenteeism equates to a 6.6% decline in productivity.[92]

Combined with industry-specific obesity and overweight impacts and wages, we estimate that weight-associated presenteeism annually costs employers $2,427 per employee with obesity and $864 per employee with overweight. The obesity estimate is lower than the midpoint of the range reported in a literature review ($2,427 versus $2,659), while the overweight estimate is higher than the midpoint of the range reported in a literature review ($864 versus $622) in 2023 dollars.[17]

The overall presenteeism cost attributed to excess body weight across all industries is estimated at $160.3 billion, with $113.8 billion associated with obesity and $46.5 billion associated with overweight. The obesity figure aligns with projections by the World Obesity Federation, which estimated U.S. presenteeism costs associated with obesity at $101.06 billion in 2020 ($119.2 billion in 2023 dollars).[98]

Injury Risk, Disability Payments, and Workers’ Compensation Payments

The connection between obesity and work-related injuries has garnered increasing attention in occupational health research as studies indicate a correlation between higher BMI and elevated risk of workplace injuries.[99–102] Obesity can

contribute to diminished physical agility, reduced flexibility, and impaired balance, factors that may compromise an individual's ability to perform certain job tasks safely. Additionally, workers with obesity and comorbid conditions like sleep apnea may experience fatigue more quickly, leading to decreased alertness and increased susceptibility to accidents. One study reports that employees with obesity are 26–107% more likely to have had an occupational injury than their healthy weight peers.[103]

In a 2023 study utilizing MarketScan data encompassing 719,482 employees, obesity is associated with higher annual employer costs of $623 for short term disability, $41 for long term disability, and $112 for Workers' Compensation Program payments per employee with obesity, relative to employees with healthy weight.[14] These findings serve as the foundation for our national estimates regarding the financial burden of disability and workers' compensation attributable to obesity.

Injury risk and associated costs vary across industries due to specific risk factors, demographic disparities, and economic influences. Analyzing NHIS data from 2013 to 2018, which records instances of workplace injuries during paid employment, we examined the likelihood of injury claims among employees categorized by weight and industry controlling for demographics and year of data collection. The Construction sector exhibits the highest on-the-job injury rates, with annual probabilities of 37%, 45%, and 51% for individuals with healthy weight, overweight, and obesity, respectively. After demographic adjustments, we estimate that 27% of injuries sustained by individuals with obesity in Construction are directly linked to their weight. Conversely, the Financial Activities sector demonstrates considerably lower injury rates, with probabilities of 5%, 7%, and 8% for healthy weight, overweight, and obese individuals, respectively. Even so, after controlling for demographics, an estimated 38% of injuries among individuals with obesity in Financial Activities are attributable to their weight.

Further analysis of the MEPS data, linked to the NHIS, reveals significant variation in workers' compensation payments per incident across industries, ranging from $122 in the Professional & Business Services sector to $592 in Manufacturing. By combining industry-specific variations in injury risk and compensation costs per incident and applying them to average industry costs for disability and workers' compensation payments, we estimate that obesity-related expenses per worker range from $118 in the Financial Activities sector to $1,857 in the Construction sector.

Other Workforce Implications

Quantifying the correlation between obesity and its impact on workforce dynamics, along with the subsequent economic implications for employers, presents a considerable challenge. In our analysis, we delved into the potential ramifications of obesity on critical aspects such as labor force participation, employee turnover, hiring practices, career advancement, and workforce resilience. However, owing to limitations in available data, we exclude these specific elements from our estimations of the overall cost of obesity to employers.

Labor Force Participation

Obesity has a discernible impact on lowering the employment rate, creating a complex interplay between health and economic factors. The health complications associated with obesity, such as reduced mobility and increased susceptibility to chronic conditions, can result in higher rates of absenteeism and lower job performance. This, in turn, diminishes an individual's competitiveness in the job market. As a consequence, the collective impact of these factors contributes to a lower employment rate among those affected by obesity.[104–106] Analysis of the NHIS indicates that men with obesity have 7% lower odds of being employed compared to men with healthy weight, while women with obesity have 20% lower odds of being employed compared to women with healthy weight.[23] The reasons why obesity is associated with lower labor force participation are unclear, but a study of the working age population in the United Kingdom suggests that obesity is more likely to exert a causal effect on employment status through an individual's health rather than through increased unemployment arising from social discrimination.[106] The financial impact on employers of lower labor force participation is

unclear and is excluded from our calculations, but in a tight labor market the diminished availability of workers will tend to drive up labor costs and constrain employer's ability to grow.

Turnover

Limited data on the connection between excess body weight and employee turnover yields mixed findings. One study reports that overweight and obesity are linked to lower voluntary turnover, with no discernible relationship observed between excess weight and involuntary turnover.[107] In a multi-national study, higher BMI is associated with diminished satisfaction with work life, contributing to an increased likelihood of turnover.[108] A study of employees in Germany finds that higher BMI correlates with increased weight-based stereotype threat at work, negatively impacting employees' perceived work ability and indicating a potential propensity for job changes among those with obesity.[109] The presence of comorbid conditions related to obesity is associated with higher mortality, with a notable portion of premature deaths occurring among demographic groups likely to still be in the workforce, absent premature death.[8,21,23]

Given data limitations, our analysis excludes costs associated with employee turnover. Nevertheless, these findings emphasize the importance of addressing weight-related concerns in the workplace to cultivate an inclusive and supportive environment and to reduce costs for separating employees and recruiting, onboarding, and training replacements.

Hiring

Hiring decisions are critically important to employers to acquire the talent needed for long-term success. Obesity is not a protected status in most U.S. jurisdictions, and consequently there is little data collected to analyze the relationship between obesity status and a candidate's likelihood of being hired. The high prevalence of obesity has been identified as an obstacle compounding military recruitment[24], which has led to efforts to develop pre-basic training courses to help candidates meet the military's fitness requirements.[110]

Experiments assessing job candidate weight and attractiveness do support the findings that candidates with higher BMI may face biases and stereotypes during the hiring process, impacting their chances of securing a position and length of unemployment duration.[22,111] According to 11% of human resources professionals, employees with obesity are not always treated reasonably compared to healthy weight employees, and for potential job candidates during the application process, an applicant's weight can play a role in the job application process or hiring process.[112] Hiring managers, knowingly or unknowingly, may hold preconceived notions about the work ethic, productivity, and overall suitability of individuals with obesity. This bias could lead to discrimination, hinder the candidate's progression through the hiring stages, and ultimately limit their opportunities in the job market.

Due to limited data, our analysis excludes any obesity-related economic impact on employers in their hiring decisions. However, discrimination of any kind can lead to hiring a suboptimal workforce. In states and cities with workplace protections for people with obesity, such discrimination can lead to litigation and other costs to the employer. Recognizing and addressing these biases is crucial for creating a more inclusive hiring process that values individuals based on their skills, qualifications, and potential contributions to the workforce, regardless of their body weight. Employers who prioritize fair and equitable hiring practices contribute not only to individual well-being but also to building diverse and dynamic teams.

Career Advancement

In optimizing the workforce, employers prioritize both business imperatives and ethical considerations when promoting career advancement opportunities. Employee development entails seizing leadership roles and enhancing skills, yielding benefits for both individuals and the organization, such as improved talent retention, productivity, satisfaction,

sustainability, and overall success.[113] Supporting career advancements, including diversity, leadership development, and skill growth, is crucial for organizational development. Diverse workforces create inclusive environments, fostering innovation and reflecting organizational values.[114]

People with obesity often face stigma, bias, and discrimination in various areas of life, including education, employment, healthcare, and interpersonal relationships.[115] Individuals with obesity might be less accepted and perceived as lazy, incapable of completing tasks, and lacking determination.[116] These stereotypes can result in reduced self-confidence and hinder professional development.[116] Research indicates that approximately 15% of U.S. workers report experiencing colleagues making inaccurate assumptions about them based on their weight.[112] Alarmingly, 72% of those who perceive unfair treatment due to their weight have contemplated leaving their jobs as a result of such discrimination.[112]

Employers who provide benefits to employees may fall short on addressing the specific needs of employees with obesity since evidence shows "low participation and success rates."[117] Individuals with obesity have reported that programs focused on the complications of obesity and tailored for specific needs of employees are insufficient.[117]

Due to data limitations, any impact of obesity that impedes career advancement is omitted from our analysis of the economic impact of obesity from the perspective of employers. Still, to enhance business performance and career advancements for all employees, organizations can support individuals based on skills, qualifications, and contributions rather than physical attributes. Acknowledging, embracing, and supporting an equitable workplace is essential for long-term organizational success.

Workforce Resilience

Workforce resilience refers to the ability of an organization's employees to adapt, recover, and thrive in the face of challenges, disruptions, or adversities. It encompasses the capacity of individuals and teams within the workforce to withstand stress, bounce back from setbacks, and effectively navigate change.[118] A resilient workforce is characterized by employees who can maintain high performance and productivity levels, both individually and collectively, despite external pressures or uncertainties. Organizations that prioritize and cultivate workforce resilience are better positioned to navigate uncertainties, retain top talent, and maintain high levels of productivity and employee satisfaction.

The COVID-19 pandemic highlighted the need for workforce dynamism during drastic changes. Resilience investment is associated with lower burnout, higher engagement, and increased profitability.[119] Prominent models of workforce resilience utilize the biopsychosocial model of employee health. Within this framework, employees' physical and behavioral health are highly consequential to organizational performance.[30,120,121] Obesity's role as a major risk factor for various physical and mental health conditions, in conjunction with the detrimental social effects of weight stigma and discrimination, makes excess weight among employees a disruptive force when building resilience in the workforce. The current literature on workforce resilience has provided limited coverage of a direct relationship with obesity. As such, the considerations below detail various components of workforce resilience that intersect with obesity, as well as obesity's effects on employee well-being and capacity when confronted with challenges in life or in the workplace.

- **Physical Health and Safety:** Obesity predisposes individuals to a variety of chronic illnesses, impacting employees' physical well-being. Among the most common obesity-related comorbidities are type 2 diabetes, osteoarthritis, asthma, sleep apnea, and cardiovascular disease, which research suggests reduce workforce participation and worker productivity.[122–125] High comorbidity with various obesity-related diseases may also predispose employees to longer recovery times from accidents and illness from infectious disease, further reducing productivity while raising the cost of workers' compensation. Furthermore, compounding health complications from comorbid conditions place workers at risk of early mortality or premature retirement from the workforce.[122,124]

  For many occupations, obesity reduces the available labor force. Obesity is associated with a 7% decline in odds of employment for men, and a 20% decline in odds of employment for women relative to their peers with healthy

weight.[23] Some occupations have specific weight or physical fitness requirements due to safety concerns or performance expectations. Other occupations require high levels of physical exertion, and obesity can limit mobility, stamina, and overall physical performance, making it more challenging to meet the physical demands of these jobs. This can result in decreased work efficiency, increased fatigue, and a higher risk of work-related injuries. Diminished resilience under these conditions may lead to reduced productivity and increased health-related absences, especially in physically demanding industries such as manufacturing, warehousing, and transportation during surge periods.

- **Acute Respiratory Illnesses (ARI):** Illness caused by infectious diseases has been a longstanding driver of productivity loss in the workplace. These detrimental effects were exacerbated during the COVID-19 pandemic. While economic activity has experienced a rebound following the pandemic, acute respiratory illnesses caused by COVID-19 and influenza are expected to exert a continued impact on the workplace as endemic illnesses. At a person-level, illness from ARIs induces losses in productivity due to health- and quarantine-related absences, diminished performance among sick and recovering employees, and time lost due to the need for infection control protocol (i.e., site disinfection and contact tracing). Furthermore, these effects are potentially multiplied if ARIs circulate throughout the workforce. Seasonal upticks in respiratory illness, paired with the frequent introduction of novel vaccine-evading subvariants, makes economic impact of ARIs not only detrimental, but highly volatile and unpredictable.

  Prolonged experience with obesity induces a state of chronic system inflammation capable of dysregulating the body's immune system functions. Consequently, high body fat content increases susceptibility to various infectious diseases, notably acute respiratory illnesses. Epidemiological and clinical data suggest a higher incidence of both COVID-19 and influenza among patients with obesity compared to those at healthy weight.[126,127] Similarly, secondary literature contends that adults with obesity, even if vaccinated, face heightened risk of severe illness, hospitalization, and intermittent mandatory ventilation.[128] Literature suggests that these adverse clinical outcomes translate to greater costs in the workplace. Workers diagnosed with COVID-19 and influenza alike report lower productivity in the workplace due to physical and temporary mental impairment.[129–131] Moreover, the duration of symptomatic and viral shedding periods among people with obesity is on average longer than with those with healthy weight. Consequently, employees experiencing obesity are susceptible to missing more work for recovery or compliance with workplace infection control protocols.

  Although reducing obesity in the workforce cannot prevent all ARI infections, it holds the potential of mitigating against severe, prolonged symptoms and higher infection rates. These modifications allow for faster rebounds from workplace outbreaks, with blunted effects on employee health and productivity.

  An emerging body of literature on long term symptoms following COVID-19 infection, commonly referred to as "long COVID," has brought attention to its impact on workers' health and livelihoods. Responses to the October 2023 National Center for Health Statistics' Household Pulse Survey reveal that 22.75% of adults with a prior COVID-19 diagnosis reported experiencing long COVID symptoms, 81.40% of whom reported activity limitations due to the illness.[132] Cross-sectional clinical data shows a significant association between the prevalence of long COVID and increasing BMI class, suggesting a heightened impact on those with obesity.[133] Furthermore, long COVID workers' compensation claimants across industries may face significant intervals of time out of work, with 71% remaining out of the workforce or in treatment for 6 months or more.[134]

- **Mental Health and Stress:** Mental health occupies a significant role in workforce resilience through its impact on employee self-efficacy, burnout, and presenteeism. In addition to these factors' effects on daily occupational operations, they may diminish resilience in the face of daily stressors or sudden change.[135,136] Stigma surrounding its discussion in the workplace presents challenges in analyzing its interplay with obesity and work. However, growing interest in the comorbidity of discrete mental health conditions and obesity in the event of stress provides a roadmap for the benefits of obesity and mental distress mitigation alike.

Studies show a higher prevalence of depressive symptoms among individuals with obesity, with the obesity impact larger for women than for men.[137–139] The gendered effects of obesity and depression predispose women to a greater risk of burnout, productivity loss, or aversion from the workforce altogether. This incurs a twofold effect on not only workforce resilience, but diversity, equity, and inclusion efforts in the workplace.

Furthermore, the relationship between obesity and mental distress is frequently bidirectional. While the relationship between mental health and higher BMI requires further scholarly exploration, their association may lie in obesogenic coping mechanisms such as binge eating or low physical activity linked to depressed mood.[140] This self-reinforcing feedback loop underscores the importance of not only curbing obesity in the workplace, but establishing a healthy work environment that reduces unreasonable stressors that may drive employees to unhealthy coping mechanisms. The downstream economic effects of a workforce experiencing lower rates of obesity and mental illness include higher employee self-efficacy, engagement, and productivity, as well as potentially lower costs for mental health treatment.[140,141]

Many of the aspects of obesity's impact on workforce resilience are discussed in other parts of this report and included in the economic model of obesity costs—such as the impact on productivity. During times of pandemic such as experienced in the early part of the COVID-19 pandemic before vaccination became widely available, workers with obesity-related comorbidities experienced a disproportionate cost in terms of COVID-19 severity and early mortality.[128,133] Hence, the economic impacts of obesity to employers might not be constant over time but experience seasonal fluctuations as well as years where costs are substantially higher.

Summary of the Cost of Excess Weight to Employers and Employees

The nonfarm industry sectors, comprising around 158 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] Across these sectors, approximately 53% of workers are male, 23% are aged 55 years or older, and 23% belong to a racial or ethnic minority population.[142] Our analysis of the NHIS indicates that around 30% (46.9 million) of these workers have obesity and 34% (53.8 million) have overweight.

To model the impact of obesity and overweight across industry sectors, we considered industry-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks. Industry-specific parameters and outcomes are summarized in Appendices, with key national parameters and model assumptions summarized in Exhibit 5.

Exhibit 5. Model Parameters for the US Nonfarm Industries

Model Input	Parameter	Source
Employment (millions)	158.0	BLS (2023)[58]
Obesity prevalence	30%	NHIS analysis
Overweight prevalence	34%	NHIS analysis
Increased medical costs per person		
Obesity impact on worker medical costs	$1,514	MEPS analysis
Overweight impact on worker medical costs	$380	MEPS analysis
Obesity impact on dependent medical costs	$1,514	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$380	Assumption based on MEPS analysis
Medical insurance and payment inputs		
Health insurance take-up rate (industry average)	59%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	81%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	60%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	63%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Other costs to employers		
Higher disability costs: Obesity	$664	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$112	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity	$1,755	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Obesity	$2,427	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis
Health-related presenteeism: Overweight	$864	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

Notes: BLS=Bureau of Labor Statistics; CPS=Current Population Survey, KFF=Kaiser Family Foundation, MEPS=Medical Expenditure Panel Survey, NHIS=National Health Interview Survey.

Summing the medical and productivity components of obesity, the annual additional cost per employee with obesity is $6,472 and the cost per employee with overweight is $1,244. These costs exclude additional healthcare costs associated with adult dependents with obesity or overweight. At the national level across nonfarm industries, excess body weight

costs employers and workers an estimated $425.5 billion (Exhibit 6). Approximately $347.5 billion is associated with obesity, and $78.0 billion is associated with overweight.

A hypothetical employer with 10,000 employees will have approximately 2,970 employees with obesity and 3,410 with overweight—as well as adult dependents who are covered by the employee's plan. The annual cost associated with excess weight is approximately $26.9 million, of which about $22 million is associated with obesity and $4.9 million is associated with overweight. An estimated $3.6 million of this cost will be paid by employees in the form of medical insurance premiums and out-of-pocket costs, $4 million of medical costs will be covered by the employer and $1.6 million of medical costs will be covered by another insurer (e.g., a spouse's insurer).

Exhibit 6. Impacts of Excess Body Weight on the Nonfarm Industries in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	157,984,000	10,000
Employees with obesity	46,900,000	2,970
Employees with overweight	53,800,000	3,410
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$41.9	$3,637,000
Employees with overweight covered by employer's plan	$12.1	$1,048,000
Dependents with obesity covered by employer's plan	$18.4	$1,601,000
Dependents with overweight covered by employer's plan	$4.6	$402,000
Employees and dependents with obesity not covered by employer's plan	$54.7	$2,042,000
Employees and dependents with overweight not covered by employer's plan	$14.8	$544,000
Total	**$146.5**	**$9,274,000**
Employer costs	$46.3	$4,018,000
Employee costs	$56.7	$3,637,000
Other payer costs	$43.5	$1,619,000
Disability costs (short term plus long term)	$31.1	$1,971,000
Workers' compensation	$5.2	$332,000
Productivity		
Absenteeism attributed to obesity	$82.3	$5,208,000
Presenteeism attributed to obesity	$113.8	$7,203,000
Presenteeism attributed to overweight	$46.5	$2,944,000
Total costs	**$425.5**	**$26,932,000**
Obesity costs	$347.5	$21,994,000
Overweight costs	$78.0	$4,938,000

Source: GlobalData Plc.

Exhibit 7 summarizes the national cost of excess weight for seven modeled industries. Detailed estimates for each industry are provided in appendices. At the national level, excess weight among government employees and covered adult dependents costs approximately $85.3 billion. Estimates are lower for other modeled industry sectors reflecting a smaller labor force, lower rates of obesity, demographics, and/or other economic factors affecting productivity. For a hypothetical organization with 10,000 employees, the cost of excess weight is still highest for the Government sector at $36.7 million. The cost is lowest for the Professional & Business Services sector at almost $19.4 million.

Exhibit 7. Total Economic Impact of Excess Body Weight by Modeled Industry in 2023

Industry	U.S. Total Cost ($billions)	Hypothetical Employer with 10,000 Employees ($)
Construction	$22.1	$26,835,000
Education & Health Services	$78.6	$30,378,000
Financial Activities	$24.1	$26,063,000
Government	$85.3	$36,726,000
Manufacturing	$44.5	$34,371,000
Professional & Business Services	$45.1	$19,354,000
Transportation & Utilities	$24.0	$32,924,000

Source: GlobalData Plc.

Potential Value of Treating Obesity

When employers contemplate strategies to tackle obesity within their workforce and among covered dependents, several critical questions emerge:

- What evidence-based options exist for treating or preventing obesity?
- To what extent do these strategies demonstrate success in achieving tangible clinical outcomes, such as weight loss and improved health, and in reducing future medical expenses while enhancing employee productivity?
- What proportion of the workforce stands to benefit from and actively participate in these options, and what are the associated costs of implementing such strategies?

Addressing these questions forms the foundation for crafting a comprehensive approach to combat obesity, foster employee health, and bolster the financial well-being of both employees and the organization.

Evidence-based Options for Treating or Preventing Obesity

Obesity is a complex and chronic disease that requires a multifaceted approach to treatment. Successful treatment of obesity typically involves a combination of intensive lifestyle interventions, behavior modifications, and medical treatments, based on the health care professional's evidence-based assessment of the patient and shared decision making on treatment goals and approach.

- **Lifestyle and behavioral interventions**: The cornerstone of obesity treatment is intensive lifestyle counseling and behavior modification programs, with studies often achieving average weight loss of 5% to 8% of initial body weight.[145–147] The Diabetes Prevention Program, for example, is well established as a cost-effective intervention to achieve modest weight management.[148] The U.S. Preventive Services Task Force recommends that primary care clinicians screen all adults for obesity, and that all adults with obesity be offered intensive multicomponent behavioral interventions.[146] Programs that offer intensive lifestyle counseling and intervention might include a registered dietitian or other trained professional to help individuals develop a personalized nutrition and physical activity plan that meets their specific needs and goals. Counseling often includes behavioral strategies such as goal setting, self-monitoring, and problem-solving to help individuals identify and overcome barriers to weight loss. Our analysis of the NHIS suggests that about one quarter (26%) of adults who are commercially insured have BMI between 30 and 31.6 and would move out of the obesity classification with a modest 5% weight loss.

- **Medical treatments**: Medical treatments may be necessary for individuals with obesity who have not achieved sufficient weight loss through intensive lifestyle interventions and behavior modifications alone. Medical treatments may be part of initial therapy based on the health care professional's assessment. These treatments include prescription anti-obesity medications and metabolic/bariatric surgery. Our analysis of the NHIS finds that three-quarters of commercially insured adults with obesity would benefit from medical intervention to achieve weight loss beyond what is achievable by lifestyle and behavioral intervention alone.
    - **Prescription anti-obesity medications** should only be used under the supervision of a healthcare provider and in combination with lifestyle interventions. Studies indicate that patients who combine anti-obesity medications that have been on the market for multiple years with lifestyle interventions achieve weight loss that is 3% to 12% higher compared to patients not using such medications.[149] Recent clinical trials with GLP-1 receptor agonists have reported average weight loss of 15% to 20%, or even higher in many patients.[150–153]
    - **Bariatric surgery** may be recommended for individuals with obesity who have not achieved sufficient weight loss with lifestyle interventions and medical treatments or who meet surgical care guidelines.[45] It can help individuals achieve significant weight loss and improve overall health. However, it is a major surgical procedure that carries risks and requires lifelong follow-up care. Different types of metabolic/bariatric procedures have been associated with an average weight loss of 25% or higher.[154,155]

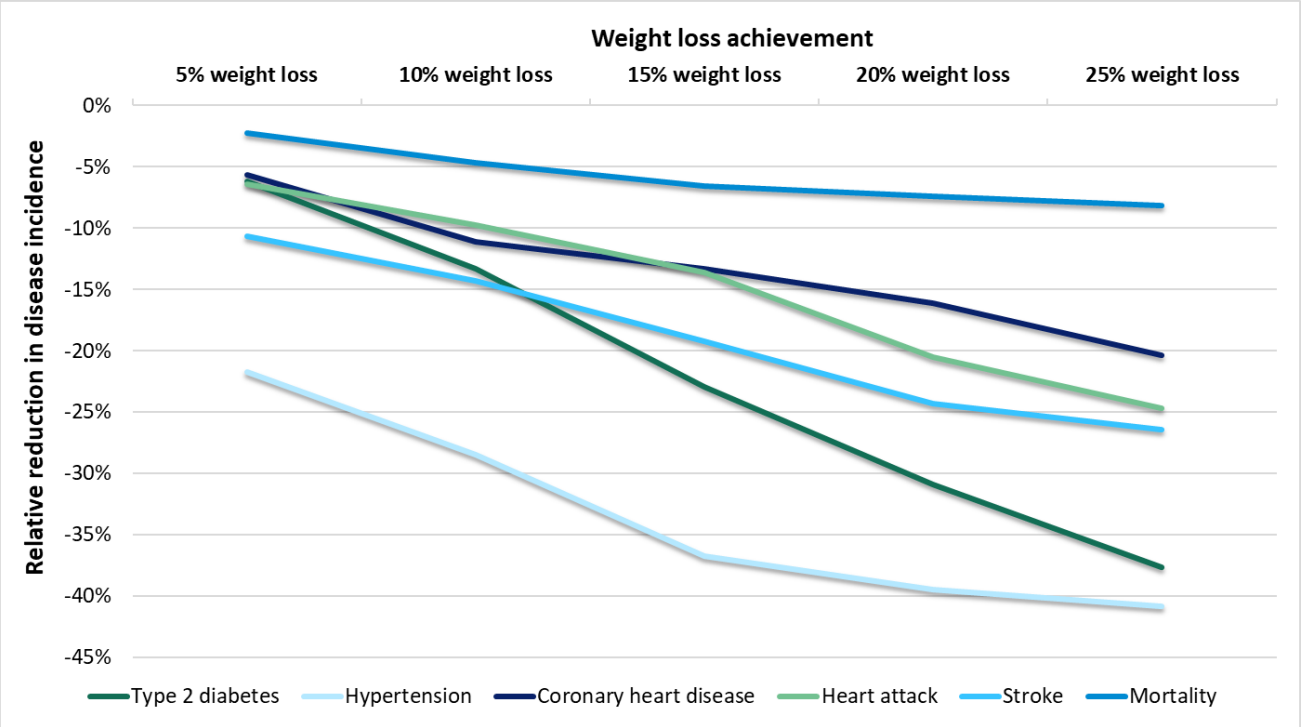
Reduced Incidence of Disease, Complications and Healthcare Costs

To demonstrate the value of treating obesity, we used a published computer simulation model, the Disease Prevention & Treatment Microsimulation Model (DPTMM),[156–160] to quantify the health and economic benefits if adults with obesity reached certain weight loss goals achievable with obesity treatment.[i] The simulation used a constructed population file that is representative of the workforce and adult dependents by industry sector.[ii] Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits.[161] Specifically, we modeled scenarios achieving and maintaining body weight loss of up to 5%, 10%, 15%, 20%, and 25% among adults with obesity. This range of modeled scenarios demonstrates the range of treatment options each with their expected levels of success in achieving clinical outcomes.

Managing obesity can result in substantial long-term economic savings. Over the upcoming decade, the current cohort of adults under age 65 with obesity will have annual medical costs that increase from $1,514 to up to $2,410 higher than costs for a comparable healthy weight population. The gap in medical spending due to obesity is projected to widen as individuals age, highlighting the long-term consequences of obesity. These estimates are lower than another published estimate of $2,438 (in 2023 dollars) higher costs for adults with private health insurance, but reflect the demographics of individuals in the workforce and reflect more recent years of data.[10]

Substantial health benefits can be achieved for adults with obesity by maintaining just a 5% loss of body weight. Over the next 5 years, this modest weight loss could result in a 6% lower incidence of type 2 diabetes, 11% fewer strokes, 6% fewer heart attacks, and a 2% reduction in overall mortality among the population with obesity (Exhibit 7). The potential improvements become even more substantial for those who can sustain greater weight loss. For this modeled cohort, sustaining 25% weight loss could potentially reduce the onset of type 2 diabetes by 38%, incidence of stroke by 26%, incidence of heart attack by 25%, incidence of heart disease by 20%, and overall mortality by 8%.

Exhibit 7. Estimated 5-year Clinical Benefits of Weight Loss for Adults with Obesity (all Industries)



Source: GlobalData Plc.

These clinical improvements also translate into significant cost savings in healthcare expenditures. Among those who successfully achieve a 5% weight loss, in the first year an average savings of $430 can be expected. If this weight loss is maintained over five years, then cumulative medical cost savings per person could reach $2,270 (Exhibit 8). Simulated medical savings tend to compound, and over ten years this 5% reduction in body weight could result in $5,310 in medical savings. Under the 25% weight loss scenario, simulated savings are $810 in the first year, $4,830 over five years, and $13,510 over ten years. Particularly for individuals with a BMI greater than 40 kg/m2, sustaining a higher weight loss can lead to medical savings of $1,270 in the first year, $7,950 over five years, and $21,980 over the next 10 years (Exhibit 9).

Exhibit 8. Estimated 5-year Aggregate Medical Savings Due to Weight Loss per Individual with Obesity

Industry/Weight Loss Scenario	5%	10%	15%	20%	25%
Construction	$2,110	$3,030	$3,900	$4,510	$4,760
Education & Health Services	$1,310	$2,350	$3,030	$3,820	$4,090
Financial Activities	$2,060	$2,870	$3,640	$4,290	$4,380
Government	$1,940	$2,960	$4,210	$4,660	$4,890
Manufacturing	$1,950	$2,960	$3,810	$4,300	$4,600
Professional & Business Services	$1,870	$2,330	$3,580	$4,330	$4,620
Transportation & Utilities	$2,230	$3,460	$4,000	$5,180	$5,310
All Industries	$2,270	$3,170	$3,840	$4,490	$4,830

Source: GlobalData Plc.

Exhibit 9. Estimated 5-year Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity

Industry/Weight Loss Scenario	5%	10%	15%	20%	25%
Construction	$2,750	$5,200	$6,520	$7,960	$9,410
Education & Health Services	$2,050	$4,460	$6,360	$7,500	$8,350
Financial Activities	$2,130	$4,580	$6,680	$7,670	$8,650
Government	$2,820	$4,320	$6,320	$7,200	$8,080
Manufacturing	$3,290	$5,450	$7,700	$9,300	$10,890
Professional & Business Services	$1,980	$4,260	$5,770	$6,610	$7,470
Transportation & Utilities	$2,620	$4,660	$6,010	$6,660	$7,330
All Industries	$2,720	$4,410	$6,040	$7,210	$7,950

Source: GlobalData Plc.

Of the estimated 158 million workers on nonfarm payrolls in 2023, approximately 46.9 million (30%) had obesity. We estimate that about 44% of employees also covered an adult dependent on their medical insurance plan, and if we conservatively assume that 30% of adult dependents had obesity then this equates to 20.6 million adult dependents with obesity. For this population with obesity, sustaining 5% weight loss could save $153.3 billion in medical costs over 5 years ($106.4 billion in savings for employees, and $46.9 billion in savings for their adult dependents) (Exhibit 10). Under the highest weight loss scenario, total medical savings would be $326.1 billion over 5 years ($226.5 billion in savings for employees, and $99.7 billion in savings for adult dependents). Under the highest weight loss scenario, there are many people with obesity who will not require the full 25% weight loss to move out of the obesity range. These savings estimates do not include the cost of intervention, as a range of treatment options could be used to achieve these results. In addition to the medical savings from treating obesity, other benefits to employers will be decreased levels of absenteeism, presenteeism, disability payments, and workers' compensation payments. Additional benefits to employees are improvements in health, mortality, and quality of life.

Exhibit 10. Estimated 5-year Aggregate Medical Cost Savings (all Industries)

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer*
5% weight loss	$153.3	$9,703,000
10% weight loss	$214.1	$13,549,000
15% weight loss	$259.3	$16,413,000
20% weight loss	$303.2	$19,191,000
25% weight loss	$326.1	$20,644,000

Source: GlobalData Plc. Note: * For a hypothetical employer of 10,000 employees we model the cumulative savings over 5 years associated with weight loss for the estimated 2,190 employees with obesity.

These results emphasize the importance and substantial benefits of long-term obesity management, particularly for individuals with higher initial BMI. By investing in sustained interventions and support systems, employers and employees can potentially alleviate the burden of obesity-related healthcare costs over time.

Recommendations to Improve Access to Obesity Treatment

Prestigious national organizations have released evidence-based guidelines concerning the prevention and treatment of obesity. These recommendations serve as valuable guidance for healthcare professionals, as well as for employers involved in decisions to provide coverage for obesity prevention and treatment initiatives.

- **The American Diabetes Association** (ADA) has issued guidelines for the prevention and treatment of obesity in the context of preventing and treating diabetes.[39]
- **The American Heart Association** (AHA) has issued guidelines for the treatment of obesity in adults, including recommendations for diet, physical activity, and behavioral therapy.[40,41]
- **The American Medical Association** (AMA) and other medical associations such as the **American Gastroenterological Association** (AGA) and the **Endocrine Society** have issued recommendations for the prevention and treatment of obesity, including the need for healthcare professionals to provide patients with evidence-based weight management strategies[42,43] and providing insurance coverage parity for emerging obesity treatment options.[44]
- **The American Society for Metabolic and Bariatric Surgery** (ASMBS) and the **International Federation for the Surgery of Obesity and Metabolic Disorders** (IFSO) have published new guidelines for weight-loss surgery.[45]
- **The Centers for Disease Control and Prevention** (CDC) has developed a framework for obesity prevention and control that includes recommendations for community-based interventions and clinical management of obesity.[46]
- **The National Institutes of Health** (NIH) has developed guidelines for the management of overweight and obesity in adults, including recommendations for lifestyle interventions, pharmacotherapy, and metabolic/bariatric surgery.[47]
- **The Obesity Action Coalition** has issued policy statements to advocate for improved access to obesity treatment and to address weight bias.[48]
- **The Obesity Medicine Association (OMA)** maintains an obesity care treatment algorithm for clinicians.[49]
- **The Obesity Society** has issued position statements on the management of obesity, including recommendations for increasing access to obesity treatment, addressing weight bias and stigma, and promoting research into the causes and treatment of obesity.[50,51]

However, despite the availability of such recommendations, access to and utilization of obesity treatment remains limited.[162] To address this issue, the following recommendations are proposed for employers to increase access to modernized[c] and evidence-based obesity care.

1. **Opt-in to comprehensive obesity insurance coverage and wellness programs for obesity care at parity with other chronic diseases**: In line with national recommendations, employers can ensure their health insurance plans cover evidence-based obesity treatments, including intensive behavioral counseling[53], nutrition support[54], pharmacotherapy[44], and metabolic/bariatric surgery[45].
2. **Upgrade, implement, or incent use of wellness programs**: Employers can implement wellness programs that specifically address obesity prevention and management.[54–56] These programs can include resources for healthy eating,

[c] Modern healthcare leverages science, technology, health capabilities, and cost-effective solutions to enhance quality, efficiency, and delivery of care.

physical activity initiatives, and access to fitness facilities or classes. For example, a targeted obesity intervention through the Diabetes Prevention Program Lifestyle Core Curriculum offered at the worksite showed a median 2.5% decline in body weight over 16 weeks.[57]

3. **Foster a culture of support and inclusion**: Employers can create a culture of support and inclusion that recognizes and accommodates the needs of employees with obesity. This can involve implementing non-discriminatory policies, offering weight bias and stigma training, creating a supportive workplace environment that promotes healthy behaviors such as providing healthy food options, offering opportunities for physical activity, and providing reasonable workplace accommodations for individuals with obesity and related health conditions.
4. **Provide education and resources**: Employers can provide education and resources to employees to educate about the health risks associated with obesity as well as strategies for obesity care and weight management. This can include partnering with their health insurance program and other providers to encourage weight assessments as part of their annual physical, and offer health screenings, health coaching, and other support services.

Employers play a crucial role in addressing obesity by implementing effective policies and programs that prioritize access to evidence-based treatment plans and resources. Taking a comprehensive approach to obesity prevention and treatment is key to improving employee health and reducing healthcare costs linked to obesity-related conditions. Beyond the health benefits, obesity prevention and treatment initiatives contribute to increased employee productivity by mitigating issues such as absenteeism, presenteeism, disability payments, and workers' compensation payments. These improvements not only positively affect the bottom line of employers but also enhance the overall quality of life for employees.

The collaborative efforts of employers, employees and their families, and healthcare systems are essential in making a substantial impact on addressing the obesity epidemic. This collective approach not only promotes the well-being of individuals but also fosters economic success for employers and their workforce, creating a healthier and more prosperous future for all involved.

Appendix A: Economic Impact of Excess Weight on the Construction Sector

The Construction sector, comprising around 8.2 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] In this sector, approximately 89% of workers are male, 22% are aged 55 years or older, and 13% belong to a racial or ethnic minority population.[142] Union representation accounts for about 12.4% of workers.[163] Our analysis of the NHIS indicates that around 32% (2.6 million) of workers in this sector have obesity, slightly higher than the 30% prevalence observed across all industries (Exhibit 11 and Exhibit 12). An additional 43% (3.5 million) workers have overweight. To model the impact of obesity and overweight in this sector, we considered sector-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks.

Exhibit 11. Model Parameters for the Construction Sector

Model Input	Parameter	Source
Employment (millions)	8.2	BLS (2023)[58]
Obesity prevalence	32%	NHIS analysis
Overweight prevalence	43%	NHIS analysis
Increased medical costs per person		
Obesity impact on worker medical costs	$1,478	MEPS analysis
Overweight impact on worker medical costs	$416	MEPS analysis
Obesity impact on dependent medical costs	$1,478	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$416	Assumption based on MEPS analysis
Medical insurance and payment inputs		
Health insurance take-up rate (industry average)	56%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	61%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	55%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	57%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Other costs to employers		
Higher disability costs: Obesity	$1,589	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$268	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity		
Health-related presenteeism: Obesity	$1,970	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Overweight	$1,332	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

Notes: BLS=Bureau of Labor Statistics; CPS=Current Population Survey, KFF=Kaiser Family Foundation, MEPS=Medical Expenditure Panel Survey, NHIS=National Health Interview Survey.

The total cost of excess body weight in this sector is estimated to be $22.1 billion in 2023, including $20 billion related to obesity and $2.1 billion related to overweight. Among a hypothetical employer with 10,000 employees, the total cost of

excess body weight exceeds $26.8 million, including $24.2 million related to obesity and $2.6 million related to overweight. However, employers do not bear the total cost. Among higher medical costs for employees and dependents, about $3.1 million is costs to the employer, $4.3 million is costs to employees in the form of insurance premiums and out-of-pocket expenses, and $2.9 million is costs to another entity such as when expenses are covered under the insurance of the workers' spouse. The productivity loss from absenteeism and presenteeism is approximately $10.6 million. While employers shoulder the majority of this cost, it's plausible that employees also bear some of it through reduced earnings.

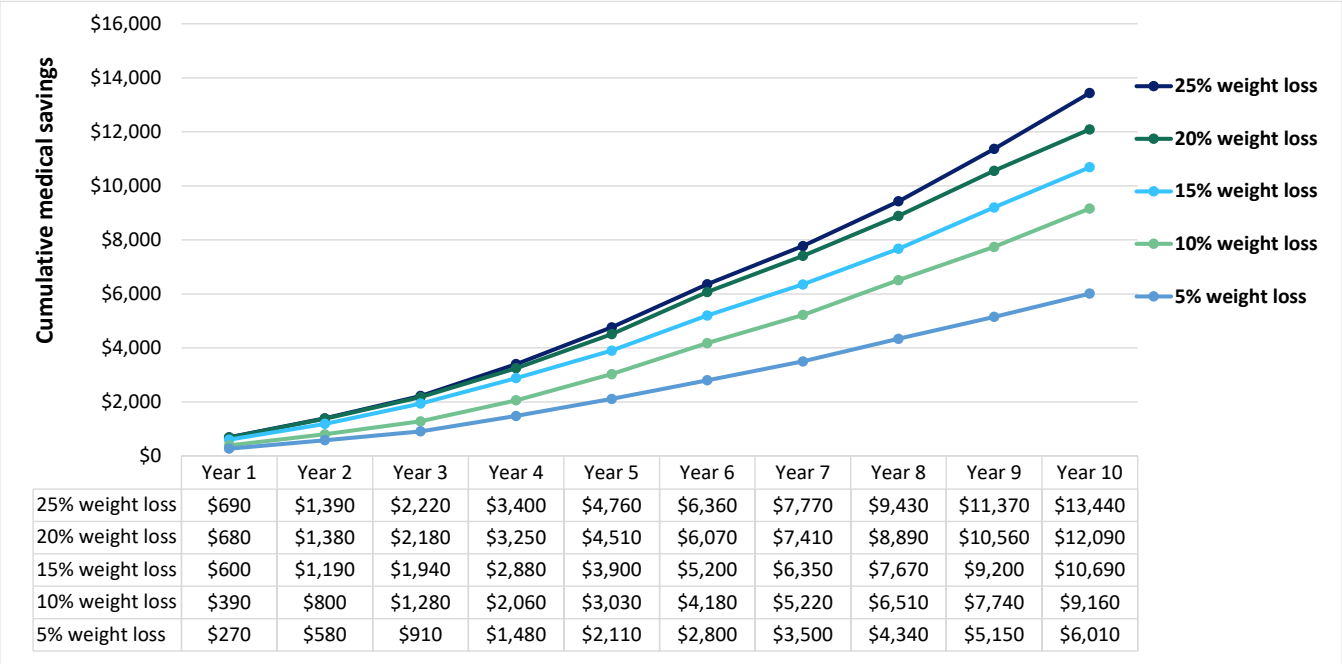
Exhibit 12. Impacts of Obesity and Overweight on the Construction Sector in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	8,193,000	10,000
Employees with obesity	2,600,000	$2,683
Employees with overweight	3,500,000	$6,471
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$2.2	$2,901,000
Employees with overweight covered by employer's plan	$0.8	$1,084,000
Dependents with obesity covered by employer's plan	$1.0	$1,277,000
Dependents with overweight covered by employer's plan	$0.3	$359,000
Employees and dependents with obesity not covered by employer's plan	$3.2	$3,505,000
Employees and dependents with overweight not covered by employer's plan	$1.0	$1,156,000
Total	**$8.5**	**$10,282,000**
Employer costs	$2.4	$3,092,000
Employee costs	$3.5	$4,273,000
Other payer costs	$2.6	$2,917,000
Disability costs (short term plus long term)	$4.2	$5,098,000
Workers' compensation	$0.7	$860,000
Productivity		
Absenteeism attributed to obesity	$5.2	$6,321,000
Presenteeism attributed to obesity	$3.5	$4,274,000
Presenteeism attributed to overweight	$0	$0
Total costs	**$22.1**	**$26,835,000**
Obesity costs	$20.0	$24,236,000
Overweight costs	$2.1	$2,599,000

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

Using NHANES data, we created a representative sample of the employee and covered adult dependents population with obesity in the construction sector. Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits. Using the DPTMM, we simulated clinical outcomes and medical cost savings associated with sustaining body weight loss of 5% to 25% (Exhibit 13 and Exhibit 14).

Exhibit 13. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$690	$1,390	$2,220	$3,400	$4,760	$6,360	$7,770	$9,430	$11,370	$13,440
20% weight loss	$680	$1,380	$2,180	$3,250	$4,510	$6,070	$7,410	$8,890	$10,560	$12,090
15% weight loss	$600	$1,190	$1,940	$2,880	$3,900	$5,200	$6,350	$7,670	$9,200	$10,690
10% weight loss	$390	$800	$1,280	$2,060	$3,030	$4,180	$5,220	$6,510	$7,740	$9,160
5% weight loss	$270	$580	$910	$1,480	$2,110	$2,800	$3,500	$4,340	$5,150	$6,010

Source: GlobalData Plc.

Exhibit 14. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$1,780	$3,250	$4,930	$7,030	$9,410	$11,610	$14,060	$17,180	$20,580	$24,680
20% weight loss	$1,490	$2,740	$4,150	$5,950	$7,960	$9,910	$12,150	$14,870	$17,910	$21,280
15% weight loss	$1,190	$2,230	$3,380	$4,880	$6,520	$8,210	$10,250	$12,570	$15,240	$17,890
10% weight loss	$780	$1,600	$2,530	$3,820	$5,200	$6,550	$8,200	$9,990	$12,190	$14,400
5% weight loss	$330	$740	$1,250	$1,960	$2,750	$3,330	$4,220	$5,240	$6,480	$7,910

Source: GlobalData Plc.

The estimated 5-year aggregate medical cost savings based on different weight loss scenarios is presented for the entire Construction sector as well as for a hypothetical employer with 10,000 employees with covered adult dependents (Exhibit 15). The 5% weight loss scenario could achieve $8.0 billion in industry savings, while the 25% weight loss scenario could achieve $18.0 billion in savings. For the hypothetical employer, 5% weight loss could achieve nearly $9.8 million in savings while 25% weight loss could achieve $22.0 million in savings.

Exhibit 15. Estimated 5-year Aggregate Medical Cost Savings

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer
5% weight loss	$8.0	$9,750,000
10% weight loss	$11.5	$14,002,000
15% weight loss	$14.8	$18,022,000
20% weight loss	$17.1	$20,841,000
25% weight loss	$18.0	$21,996,000

Source: GlobalData Plc.

Appendix B: Economic Impact of Excess Weight on the Education and Health Sector

The education and health sector, comprising around 25.9 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] In this sector, approximately 25% of workers are male, 24% are aged 55 years or older, and 25% belong to a racial or ethnic minority population.[142] Union representation accounts for about 9% of workers.[163] Our analysis of the NHIS indicates that around 31% (8.1 million) of workers in this sector have obesity, slightly higher than the 30% prevalence observed across all industries (Exhibit 16 and Exhibit 17). An additional 36% (9.3 million) workers have overweight. To model the impact of obesity and overweight in this sector, we considered sector-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks.

Exhibit 16. Model Parameters for the Education and Health Sector

Model Input	Parameter	Source
Employment (millions)	25.9	BLS (2023)[58]
Obesity prevalence	31%	NHIS analysis
Overweight prevalence	36%	NHIS analysis
Increased medical costs per person		
Obesity impact on worker medical costs	$1,639	MEPS analysis
Overweight impact on worker medical costs	$447	MEPS analysis
Obesity impact on dependent medical costs	$1,639	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$447	Assumption based on MEPS analysis
Medical insurance and payment inputs		
Health insurance take-up rate (industry average)	59%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	64%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	62%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	65%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Other costs to employers		
Higher disability costs: Obesity	$966	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$163	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity	$1,620	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Obesity	$2,483	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis
Health-related presenteeism: Overweight	$1,171	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

Notes: BLS=Bureau of Labor Statistics; CPS=Current Population Survey, KFF=Kaiser Family Foundation, MEPS=Medical Expenditure Panel Survey, NHIS=National Health Interview Survey.

The total cost of excess body weight in this sector is estimated to be $78.6 billion in 2023, including $63.6 billion related to obesity and $14.9 billion related to overweight. Among a hypothetical employer with 10,000 employees, the total cost of

excess body weight is nearly $30.4 million, including nearly $24.6 million related to obesity and $5.8 million related to overweight. However, employers do not bear the total cost. Among higher medical costs for employees and dependents, about $3.8 million is costs to the employer, nearly $4.1 million is costs to employees in the form of insurance premiums and out-of-pocket expenses, and nearly $2.9 million is costs to another entity such as when expenses are covered under the insurance of the workers' spouse. The productivity loss from absenteeism and presenteeism is approximately $17 million. While employers shoulder the majority of this cost, it's plausible that employees also bear some of it through reduced earnings.

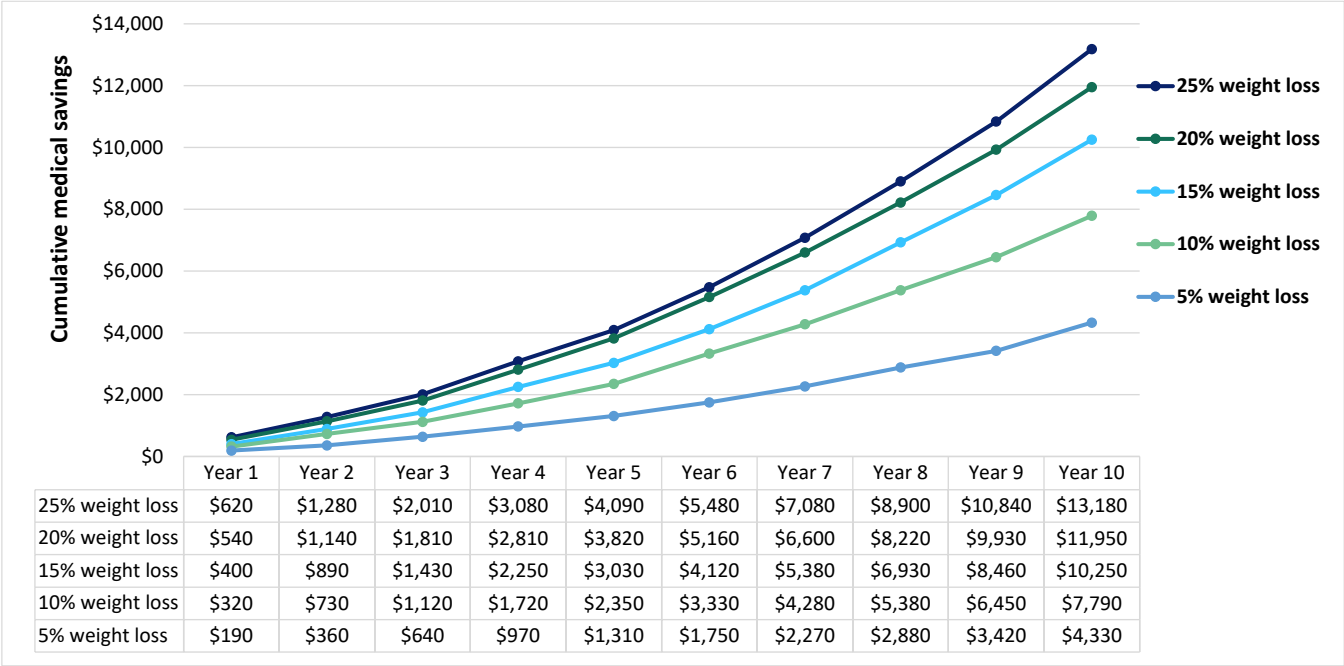
Exhibit 17. Impacts of Obesity and Overweight on the Education and Health Sector in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	25,908,700	10,000
Employees with obesity	8,100,000	3,120
Employees with overweight	7,900,000	3,050
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$7.8	$3,292,000
Employees with overweight covered by employer's plan	$2.1	$878,000
Dependents with obesity covered by employer's plan	$3.4	$1,449,000
Dependents with overweight covered by employer's plan	$0.9	$395,000
Employees and dependents with obesity not covered by employer's plan	$10.2	$3,534,000
Employees and dependents with overweight not covered by employer's plan	$2.7	$953,000
Total	**$27.1**	**$10,501,000**
Employer costs	$8.8	$3,724,000
Employee costs	$10.2	$3,969,000
Other payer costs	$8.1	$2,808,000
Disability costs (short term plus long term)	$7.8	$3,012,000
Workers' compensation	$1.3	$508,000
Productivity		
Absenteeism attributed to obesity	$13.1	$5,049,000
Presenteeism attributed to obesity	$20.0	$7,738,000
Presenteeism attributed to overweight	$9.2	$3,570,000
Total costs	**$78.6**	**$30,378,000**
Obesity costs	$63.6	$24,582,000
Overweight costs	$14.9	$5,796,000

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

Using NHANES data, we created a representative sample of the employee and covered adult dependents population with obesity in the education and health sector. Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits. Using the DPTMM, we simulated clinical outcomes and medical cost savings associated with sustaining body weight loss of 5% to 25% (Exhibit 18 and Exhibit 19).

Exhibit 18. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$620	$1,280	$2,010	$3,080	$4,090	$5,480	$7,080	$8,900	$10,840	$13,180
20% weight loss	$540	$1,140	$1,810	$2,810	$3,820	$5,160	$6,600	$8,220	$9,930	$11,950
15% weight loss	$400	$890	$1,430	$2,250	$3,030	$4,120	$5,380	$6,930	$8,460	$10,250
10% weight loss	$320	$730	$1,120	$1,720	$2,350	$3,330	$4,280	$5,380	$6,450	$7,790
5% weight loss	$190	$360	$640	$970	$1,310	$1,750	$2,270	$2,880	$3,420	$4,330

Source: GlobalData Plc.

Exhibit 19. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$1,360	$2,650	$4,270	$6,100	$8,350	$10,120	$12,000	$14,820	$17,550	$20,570
20% weight loss	$1,420	$2,560	$3,990	$5,570	$7,500	$9,080	$10,820	$13,300	$15,730	$18,500
15% weight loss	$1,180	$2,170	$3,400	$4,740	$6,360	$7,760	$9,370	$11,510	$13,640	$16,150
10% weight loss	$800	$1,490	$2,370	$3,310	$4,460	$5,490	$6,790	$8,440	$10,110	$12,020
5% weight loss	$320	$620	$1,050	$1,490	$2,050	$2,610	$3,490	$4,510	$5,570	$6,470

Source: GlobalData Plc.

The estimated 5-year aggregate medical cost savings based on different weight loss scenarios is presented for the entire Education and Health sector as well as for a hypothetical employer with 10,000 employees with covered adult dependents. (Exhibit 20). The 5% weight loss scenario could achieve $15.2 billion in industry savings, while the 25% weight loss scenario could achieve $47.6 billion in savings. For the hypothetical employer, 5% weight loss could achieve $5.9 million in savings while 25% weight loss could achieve nearly $18.4 million in savings.

Exhibit 20. Estimated 5-year Aggregate Medical Cost Savings

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer
5% weight loss	$15.2	$5,880,000
10% weight loss	$27.3	$10,548,000
15% weight loss	$35.2	$13,600,000
20% weight loss	$44.4	$17,146,000
25% weight loss	$47.6	$18,357,000

Source: GlobalData Plc.

Appendix C: Economic Impact of Excess Weight on the Financial Activities Sector

The financial activities sector, comprising around 9.2 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] In this sector, approximately 48% of workers are male, 27% are aged 55 years or older, and 22% belong to a racial or ethnic minority population.[142] Union representation accounts for about 2.5% of workers.[163] Our analysis of the NHIS indicates that around 29% (2.7 million) of workers in this sector have obesity, slightly lower than the 30% prevalence observed across all industries (Exhibit 21 and Exhibit 22). An additional 35% (3.2 million) workers have overweight. To model the impact of obesity and overweight in this sector, we considered sector-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks.

Exhibit 21. Model Parameters for the Financial Activities Sector

Model Input	Parameter	Source
Employment (millions)	9.2	BLS (2023)[58]
Obesity prevalence	29%	NHIS analysis
Overweight prevalence	35%	NHIS analysis
Increased medical costs per person		
Obesity impact on worker medical costs	$1,405	MEPS analysis
Overweight impact on worker medical costs	$316	MEPS analysis
Obesity impact on dependent medical costs	$1,405	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$316	Assumption based on MEPS analysis
Medical insurance and payment inputs		
Health insurance take-up rate (industry average)	75%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	82%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	60%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	62%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Other costs to employers		
Higher disability costs: Obesity	$101	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$17	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity	$2,426	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Obesity	$2,891	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis
Health-related presenteeism: Overweight	$461	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

Notes: BLS=Bureau of Labor Statistics; CPS=Current Population Survey, KFF=Kaiser Family Foundation, MEPS=Medical Expenditure Panel Survey, NHIS=National Health Interview Survey.

The total cost of excess body weight in this sector is estimated to be $24.1 billion in 2023, including $21 billion related to obesity and $3.1 billion related to overweight.

Among a hypothetical employer with 10,000 employees, the total cost of excess body weight exceeds $26.1 million, including nearly $22.7 million related to obesity and $3.3 million related to overweight. However, employers do not bear the total cost. Among higher medical costs for employees and dependents, nearly $3.7 million is costs to the employer, $3.3 million is costs to employees in the form of insurance premiums and out-of-pocket expenses, and $1.4 million is costs to another entity such as when expenses are covered under the insurance of the workers' spouse. The productivity loss from absenteeism and presenteeism is approximately $17.3 million. While employers shoulder the majority of this cost, it's plausible that employees also bear some of it through reduced earnings.

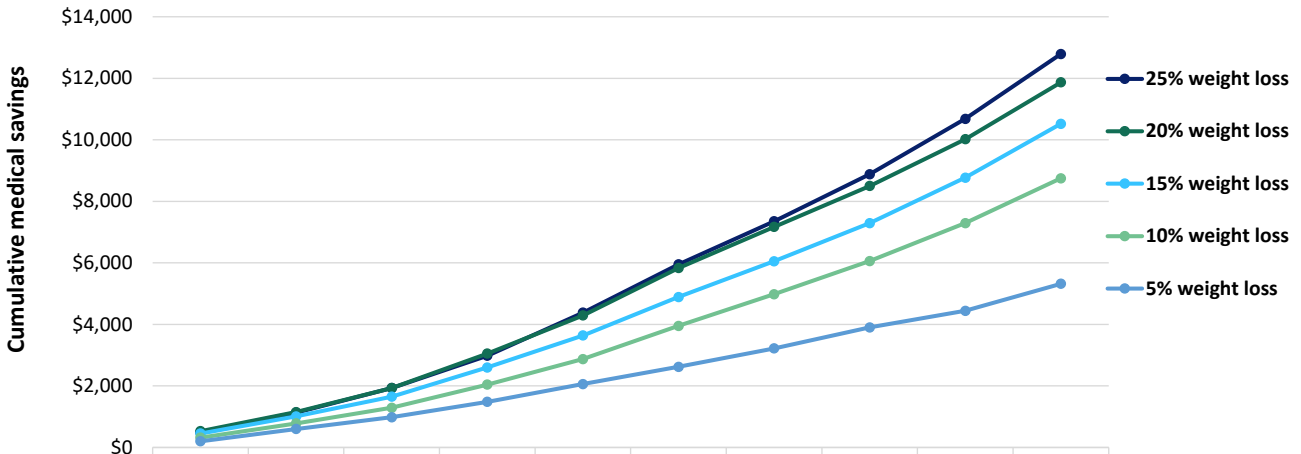
Exhibit 22. Impacts of Obesity and Overweight on the Financial Activities Sector in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	9,178,000	10,000
Employees with obesity	2,700,000	2,950
Employees with overweight	3,200,000	3,530
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$2.9	$3,395,000
Employees with overweight covered by employer's plan	$0.8	$914,000
Dependents with obesity covered by employer's plan	$1.3	$1,494,000
Dependents with overweight covered by employer's plan	$0.3	$336,000
Employees and dependents with obesity not covered by employer's plan	$2.1	$1,824,000
Employees and dependents with overweight not covered by employer's plan	$0.5	$443,000
Total	**$7.9**	**$8,406,000**
Employer costs	$3.2	$3,659,000
Employee costs	$3.1	$3,328,000
Other payer costs	$1.6	$1,419,000
Disability costs (short term plus long term)	$0.3	$297,000
Workers' compensation	$0.0	$50,000
Productivity		
Absenteeism attributed to obesity	$6.6	$7,155,000
Presenteeism attributed to obesity	$7.8	$8,527,000
Presenteeism attributed to overweight	$1.5	$1,628,000
Total costs	**$24.1**	**$26,063,000**
Obesity costs	$21.0	$22,742,000
Overweight costs	$3.1	$3,321,000

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

Using NHANES data, we created a representative sample of the employee and covered adult dependents population with obesity in the financial activities sector. Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits. Using the DPTMM, we simulated clinical outcomes and medical cost savings associated with sustaining body weight loss of 5% to 25% (Exhibit 23 and Exhibit 24).

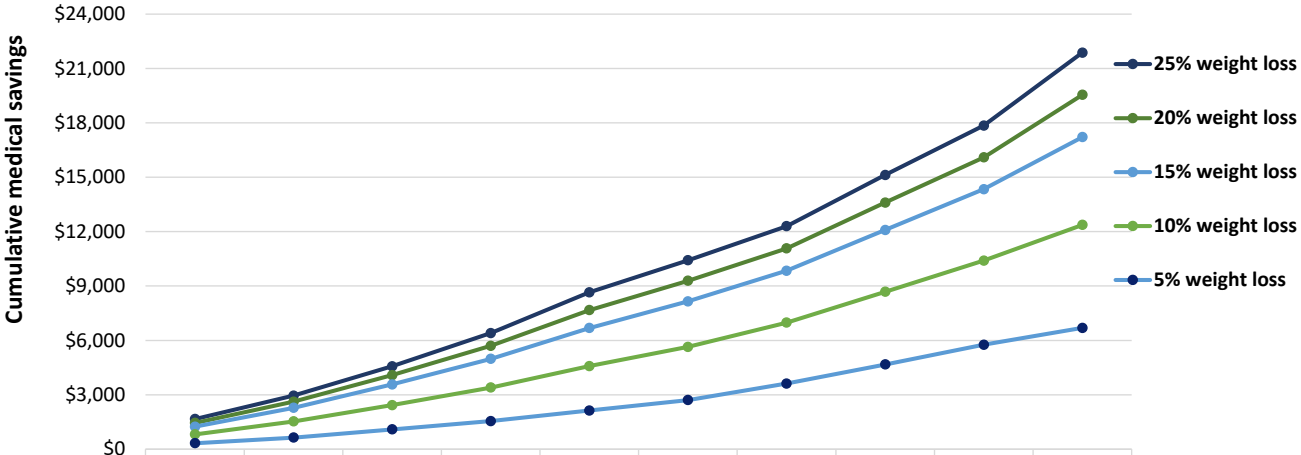
Exhibit 23. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$490	$1,130	$1,930	$2,980	$4,380	$5,950	$7,350	$8,880	$10,680	$12,790
20% weight loss	$530	$1,150	$1,930	$3,050	$4,290	$5,830	$7,170	$8,500	$10,020	$11,870
15% weight loss	$450	$1,010	$1,650	$2,600	$3,640	$4,890	$6,050	$7,290	$8,770	$10,520
10% weight loss	$320	$780	$1,290	$2,040	$2,870	$3,950	$4,980	$6,060	$7,290	$8,750
5% weight loss	$200	$600	$980	$1,480	$2,060	$2,620	$3,220	$3,900	$4,440	$5,320

Source: GlobalData Plc.

Exhibit 24. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$1,660	$2,950	$4,570	$6,400	$8,650	$10,420	$12,300	$15,120	$17,850	$21,870
20% weight loss	$1,450	$2,620	$4,080	$5,700	$7,670	$9,290	$11,070	$13,600	$16,090	$19,540
15% weight loss	$1,240	$2,280	$3,570	$4,980	$6,680	$8,150	$9,840	$12,090	$14,340	$17,210
10% weight loss	$820	$1,530	$2,430	$3,400	$4,580	$5,640	$6,980	$8,680	$10,400	$12,370
5% weight loss	$330	$640	$1,090	$1,550	$2,130	$2,710	$3,620	$4,670	$5,760	$6,690

Source: GlobalData Plc.

The estimated 5-year aggregate medical cost savings based on different weight loss scenarios is presented for the entire Financial Activities sector as well as for a hypothetical employer with 10,000 employees with covered adult dependents (Exhibit 25). The 5% weight loss scenario could achieve $8.0 billion in industry savings, while the 25% weight loss scenario could achieve $17.1 billion in savings. For the hypothetical employer, 5% weight loss could achieve nearly $8.8 million in savings while 25% weight loss could achieve $18.6 million in savings.

Exhibit 25. Estimated 5-year Aggregate Medical Cost Savings

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer
5% weight loss	$8.0	$8,751,000
10% weight loss	$11.2	$12,191,000
15% weight loss	$14.2	$15,462,000
20% weight loss	$16.7	$18,223,000
25% weight loss	$17.1	$18,605,000

Source: GlobalData Plc.

Appendix D: Economic Impact of Excess Weight on the Government Sector

The government sector, comprising around 23.2 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] In this sector, approximately 55% of workers are male, 27% are aged 55 years or older, and 27% belong to a racial or ethnic minority population.[142] Our analysis of the NHIS indicates that around 36% (8.3 million) of workers in this sector have obesity, notably higher than the 30% prevalence observed across all industries (Exhibit 26 and Exhibit 27). An additional 36% (8.3 million) workers have overweight. To model the impact of obesity and overweight in this sector, we considered sector-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks.

Exhibit 26. Model Parameters for the Government Sector

Model Input	Parameter	Source
Employment (millions)	23.2	BLS (2023)[58]
Obesity prevalence	36%	NHIS analysis
Overweight prevalence	36%	NHIS analysis
Increased medical costs per person		
Obesity impact on worker medical costs	$1,751	MEPS analysis
Overweight impact on worker medical costs	$408	MEPS analysis
Obesity impact on dependent medical costs	$1,751	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$408	Assumption based on MEPS analysis
Medical insurance and payment inputs		
Health insurance take-up rate (industry average)	79%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	79%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	71%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	74%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Other costs to employers		
Higher disability costs: Obesity	$913	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$154	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity	$2,226	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Obesity	$2,840	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis
Health-related presenteeism: Overweight	$609	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

Notes: BLS=Bureau of Labor Statistics; CPS=Current Population Survey, KFF=Kaiser Family Foundation, MEPS=Medical Expenditure Panel Survey, NHIS=National Health Interview Survey.

The total cost of excess body weight in this sector is estimated to be $85.3 billion in 2023, including $74.7 billion related to obesity and $10.6 billion related to overweight. Among a hypothetical employer with 10,000 employees, the total cost of

excess body weight exceeds $36.7 million, including nearly $32.2 million related to obesity and $4.6 million related to overweight. However, employers do not bear the total cost. Among higher medical costs for employees and dependents, about $6.2 million is costs to the employer, $4.0 million is costs to employees in the form of insurance premiums and out-of-pocket expenses, and $2.3 million is costs to another entity such as when expenses are covered under the insurance of the workers' spouse. The productivity loss from absenteeism and presenteeism is approximately $20.4 million. While employers shoulder the majority of this cost, it's plausible that employees also bear some of it through reduced earnings.

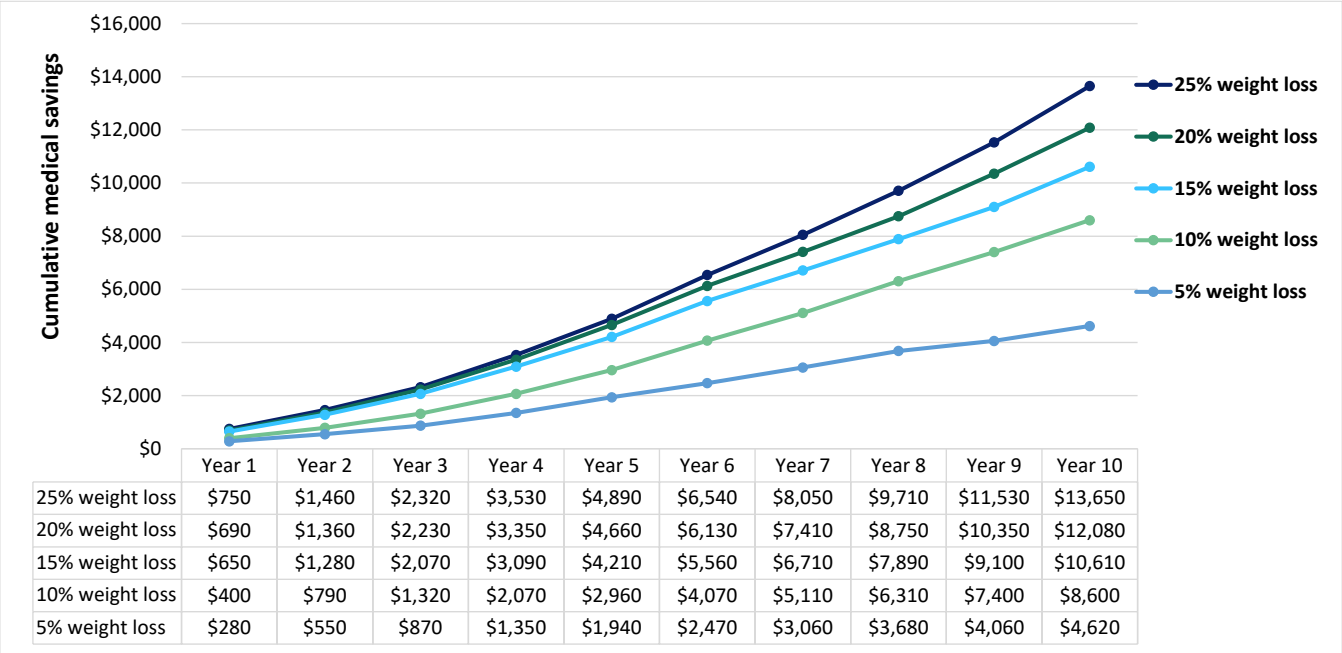
Exhibit 27. Impacts of Obesity and Overweight on the Government Sector in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	23,243,000	10,000
Employees with obesity	8,300,000	3,590
Employees with overweight	8,300,000	3,590
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$11.5	$4,961,000
Employees with overweight covered by employer's plan	$2.7	$1,156,000
Dependents with obesity covered by employer's plan	$5.1	$2,184,000
Dependents with overweight covered by employer's plan	$1.2	$509,000
Employees and dependents with obesity not covered by employer's plan	$7.0	$3,029,000
Employees and dependents with overweight not covered by employer's plan	$1.6	$706,000
Total	**$29.1**	**$12,545,000**
Employer costs	$14.5	$6,211,000
Employee costs	$9.2	$3,996,000
Other payer costs	$5.4	$2,338,000
Disability costs (short term plus long term)	$7.6	$3,275,000
Workers' compensation	$1.3	$552,000
Productivity		
Absenteeism attributed to obesity	$18.6	$7,984,000
Presenteeism attributed to obesity	$23.7	$10,186,000
Presenteeism attributed to overweight	$5.1	$2,184,000
Total costs	**$85.3**	**$36,726,000**
Obesity costs	$74.7	$32,171,000
Overweight costs	$10.6	$4,555,000

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

Using NHANES data, we created a representative sample of the employee and covered adult dependents population with obesity in the government sector. Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits. Using the DPTMM, we simulated clinical outcomes and medical cost savings associated with sustaining body weight loss of 5% to 25% (Exhibit 28 and Exhibit 29).

Exhibit 28. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$750	$1,460	$2,320	$3,530	$4,890	$6,540	$8,050	$9,710	$11,530	$13,650
20% weight loss	$690	$1,360	$2,230	$3,350	$4,660	$6,130	$7,410	$8,750	$10,350	$12,080
15% weight loss	$650	$1,280	$2,070	$3,090	$4,210	$5,560	$6,710	$7,890	$9,100	$10,610
10% weight loss	$400	$790	$1,320	$2,070	$2,960	$4,070	$5,110	$6,310	$7,400	$8,600
5% weight loss	$280	$550	$870	$1,350	$1,940	$2,470	$3,060	$3,680	$4,060	$4,620

Source: GlobalData Plc.

Exhibit 29. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$1,610	$2,890	$4,340	$6,100	$8,080	$10,160	$12,410	$15,300	$18,410	$21,930
20% weight loss	$1,390	$2,550	$3,850	$5,450	$7,200	$9,080	$11,140	$13,670	$16,480	$19,530
15% weight loss	$1,170	$2,210	$3,360	$4,790	$6,320	$8,010	$9,890	$12,060	$14,580	$17,160
10% weight loss	$620	$1,320	$2,110	$3,200	$4,320	$5,520	$6,850	$8,310	$10,180	$12,140
5% weight loss	$380	$800	$1,340	$2,060	$2,820	$3,630	$4,340	$5,220	$6,400	$7,580

Source: GlobalData Plc.

The estimated 5-year aggregate medical cost savings based on different weight loss scenarios is presented for the entire Government sector as well as for a hypothetical employer with 10,000 employees with covered adult dependents (Exhibit 30). The 5% weight loss scenario could achieve $23.3 billion in industry savings, while the 25% weight loss scenario could achieve $58.7 billion in savings. For the hypothetical employer, 5% weight loss could achieve $10.0 million in savings while 25% weight loss could achieve nearly $25.3 million in savings.

Exhibit 30. Estimated 5-year Aggregate Medical Cost Savings

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer
5% weight loss	$23.3	$10,021,000
10% weight loss	$35.5	$15,290,000
15% weight loss	$50.5	$21,747,000
20% weight loss	$55.9	$24,071,000
25% weight loss	$58.7	$25,260,000

Source: GlobalData Plc.

Appendix E: Economic Impact of Excess Weight on the Manufacturing Sector

The manufacturing sector, comprising around 13 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] In this sector, approximately 71% of workers are male, 26% are aged 55 years or older, and 21% belong to a racial or ethnic minority population.[142] Union representation accounts for about 8.6% of workers.[163] Our analysis of the NHIS indicates that around 33% (4.3 million) of workers in this sector have obesity, slightly higher than the 30% prevalence observed across all industries (Exhibit 31 and Exhibit 32). An additional 37% (4.8 million) workers have overweight. To model the impact of obesity and overweight in this sector, we considered sector-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks.

Exhibit 31. Model Parameters for the Manufacturing Sector

Model Input	Parameter	Source
Employment (millions)	13.0	BLS (2023)[58]
Obesity prevalence	33%	NHIS analysis
Overweight prevalence	37%	NHIS analysis
Increased medical costs per person		
Obesity impact on worker medical costs	$1,787	MEPS analysis
Overweight impact on worker medical costs	$447	MEPS analysis
Obesity impact on dependent medical costs	$1,787	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$447	Assumption based on MEPS analysis
Medical insurance and payment inputs		
Health insurance take-up rate (industry average)	74%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	81%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	62%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	65%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Other costs to employers		
Higher disability costs: Obesity	$1,352	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$228	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity	$2,057	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Obesity	$2,076	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis
Health-related presenteeism: Overweight	$983	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

Notes: BLS=Bureau of Labor Statistics; CPS=Current Population Survey, KFF=Kaiser Family Foundation, MEPS=Medical Expenditure Panel Survey, NHIS=National Health Interview Survey.

The total cost of excess body weight in this sector is estimated to be $44.5 billion in 2023, including $36.5 billion related to obesity and $8.1 billion related to overweight. Among a hypothetical employer with 10,000 employees, the total cost of

excess body weight exceeds $34.4 million, including nearly $28.1 million related to obesity and $6.2 million related to overweight. However, employers do not bear the total cost. Among higher medical costs for employees and dependents, nearly $5.4 million is costs to the employer, nearly $4.6 million is costs to employees in the form of insurance premiums and out-of-pocket expenses, and $2.1 million is costs to another entity such as when expenses are covered under the insurance of the workers' spouse. The productivity loss from absenteeism and presenteeism is approximately $17.2 million. While employers shoulder the majority of this cost, it's plausible that employees also bear some of it through reduced earnings.

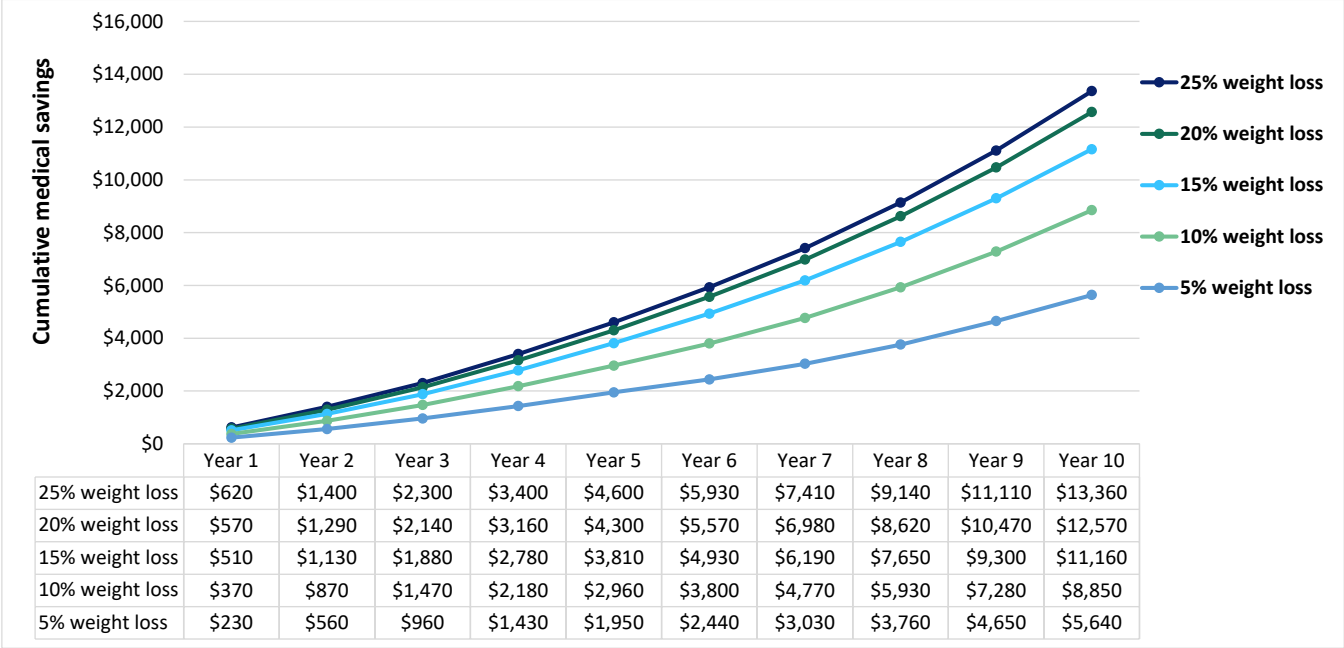
Exhibit 32. Impacts of Obesity and Overweight on the Manufacturing Sector in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	12,961,000	10,000
Employees with obesity	4,200,000	3,270
Employees with overweight	4,800,000	3,730
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$5.6	$4,721,000
Employees with overweight covered by employer's plan	$1.6	$1,348,000
Dependents with obesity covered by employer's plan	$2.5	$2,078,000
Dependents with overweight covered by employer's plan	$0.6	$520,000
Employees and dependents with obesity not covered by employer's plan	$4.2	$2,662,000
Employees and dependents with overweight not covered by employer's plan	$1.1	$706,000
Total	**$15.6**	**$12,035,000**
Employer costs	$6.4	$5,374,000
Employee costs	$5.9	$4,553,000
Other payer costs	$3.3	$2,108,000
Disability costs (short term plus long term)	$5.7	$4,417,000
Workers' compensation	$1.0	$745,000
Productivity		
Absenteeism attributed to obesity	$8.7	$6,722,000
Presenteeism attributed to obesity	$8.8	$6,784,000
Presenteeism attributed to overweight	$4.8	$3,668,000
Total costs	**$44.5**	**$34,371,000**
Obesity costs	$36.5	$28,129,000
Overweight costs	$8.1	$6,242,000

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

Using NHANES data, we created a representative sample of the employee and covered adult dependents population with obesity in the manufacturing sector. Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits. Using the DPTMM, we simulated clinical outcomes and medical cost savings associated with sustaining body weight loss of 5% to 25% (Exhibit 33 and Exhibit 34).

Exhibit 33. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$620	$1,400	$2,300	$3,400	$4,600	$5,930	$7,410	$9,140	$11,110	$13,360
20% weight loss	$570	$1,290	$2,140	$3,160	$4,300	$5,570	$6,980	$8,620	$10,470	$12,570
15% weight loss	$510	$1,130	$1,880	$2,780	$3,810	$4,930	$6,190	$7,650	$9,300	$11,160
10% weight loss	$370	$870	$1,470	$2,180	$2,960	$3,800	$4,770	$5,930	$7,280	$8,850
5% weight loss	$230	$560	$960	$1,430	$1,950	$2,440	$3,030	$3,760	$4,650	$5,640

Source: GlobalData Plc.

Exhibit 34. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$2,170	$3,880	$5,910	$8,230	$10,890	$12,870	$14,560	$17,340	$19,910	$24,290
20% weight loss	$1,850	$3,320	$5,060	$7,040	$9,300	$11,010	$12,480	$14,850	$17,050	$20,740
15% weight loss	$1,530	$2,760	$4,210	$5,850	$7,700	$9,130	$10,370	$12,320	$14,140	$17,140
10% weight loss	$1,080	$1,960	$2,980	$4,140	$5,450	$6,460	$7,350	$8,720	$10,010	$12,130
5% weight loss	$650	$1,180	$1,800	$2,500	$3,290	$3,900	$4,430	$5,260	$6,040	$7,330

Source: GlobalData Plc.

The estimated 5-year aggregate medical cost savings based on different weight loss scenarios is presented for the entire Manufacturing sector as well as for a hypothetical employer with 10,000 employees with covered adult dependents (Exhibit 35). The 5% weight loss scenario could achieve $11.9 billion in industry savings, while the 25% weight loss scenario could achieve $28.1 billion in savings. For the hypothetical employer, 5% weight loss could achieve nearly $9.2 million in savings while 25% weight loss could achieve nearly $21.7 million in savings.

Exhibit 35. Estimated 5-year Aggregate Medical Cost Savings

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer
5% weight loss	$11.9	$9,178,000
10% weight loss	$18.1	$13,931,000
15% weight loss	$23.2	$17,932,000
20% weight loss	$26.2	$20,239,000
25% weight loss	$28.1	$21,650,000

Source: GlobalData Plc.

Appendix F: Economic Impact of Excess Weight on the Professional and Business Services Sector

The professional and business services sector, comprising around 23.3 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] In this sector, approximately 58% of workers are male, 23% are aged 55 years or older, and 23% belong to a racial or ethnic minority population.[142] Union representation accounts for about 2.8% of workers.[163] Our analysis of the NHIS indicates that around 22% (5.1 million) of workers in this sector have obesity, notably lower than the 30% prevalence observed across all industries (Exhibit 36 and Exhibit 37). An additional 35% (8.1 million) workers have overweight. To model the impact of obesity and overweight in this sector, we considered sector-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks.

Exhibit 36. Model Parameters for the Professional and Business Services Sector

Model Input	Parameter	Source
Employment (millions)	23.3	BLS (2023)[58]
Obesity prevalence	22%	NHIS analysis
Overweight prevalence	35%	NHIS analysis
Increased medical costs per person		
Obesity impact on worker medical costs	$1,588	MEPS analysis
Overweight impact on worker medical costs	$355	MEPS analysis
Obesity impact on dependent medical costs	$1,588	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$355	Assumption based on MEPS analysis
Medical insurance and payment inputs		
Health insurance take-up rate (industry average)	53%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	73%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	58%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	61%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Other costs to employers		
Higher disability costs: Obesity	$196	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$33	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity	$1,518	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Obesity	$1,987	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis
Health-related presenteeism: Overweight	$1,085	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

Notes: BLS=Bureau of Labor Statistics; CPS=Current Population Survey, KFF=Kaiser Family Foundation, MEPS=Medical Expenditure Panel Survey, NHIS=National Health Interview Survey.

The total cost of excess body weight in this sector is estimated to be $45.1 billion in 2023, including $32.3 billion related to obesity and $12.8 billion related to overweight (Exhibit 37). Among a hypothetical employer with 10,000 employees, the

total cost of excess body weight exceeds $19.3 million, including nearly $13.8 million related to obesity and $5.5 million related to overweight. However, employers do not bear the total cost. Among higher medical costs for employees and dependents, about $2.8 million is costs to the employer, nearly $3.0 million is costs to employees in the form of insurance premiums and out-of-pocket expenses, and $1.6 million is costs to another entity such as when expenses are covered under the insurance of the workers' spouse. The productivity loss from absenteeism and presenteeism is approximately $11.5 million. While employers shoulder the majority of this cost, it's plausible that employees also bear some of it through reduced earnings.

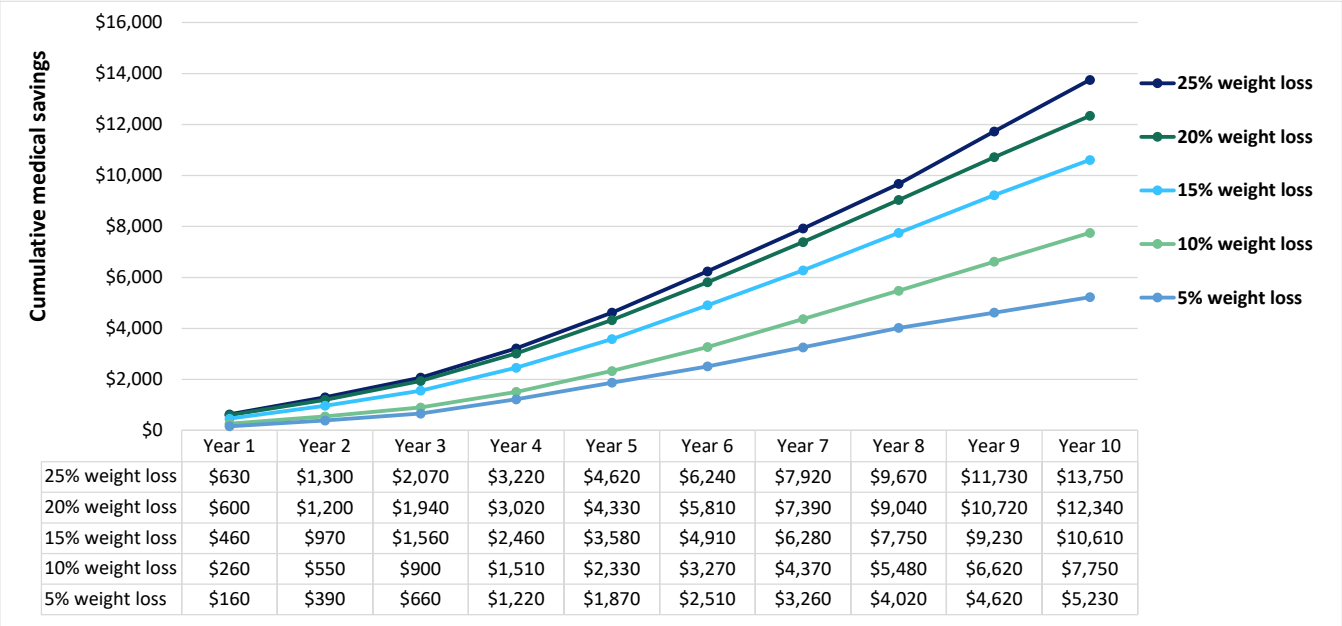
Exhibit 37. Impacts of Obesity and Overweight on the Professional and Business Services Sector in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	23,287,000	10,000
Employees with obesity	5,100,000	2,190
Employees with overweight	8,100,000	3,500
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$4.3	$2,533,000
Employees with overweight covered by employer's plan	$1.5	$903,000
Dependents with obesity covered by employer's plan	$1.9	$1,115,000
Dependents with overweight covered by employer's plan	$0.4	$249,000
Employees and dependents with obesity not covered by employer's plan	$7.0	$1,996,000
Employees and dependents with overweight not covered by employer's plan	$2.1	$573,000
Total	**$17.2**	**$7,369,000**
Employer costs	$4.7	$2,789,000
Employee costs	$6.8	$2,972,000
Other payer costs	$5.7	$1,608,000
Disability costs (short term plus long term)	$1.0	$429,000
Workers' compensation	$0.2	$72,000
Productivity		
Absenteeism attributed to obesity	$7.8	$3,330,000
Presenteeism attributed to obesity	$10.2	$4,359,000
Presenteeism attributed to overweight	$8.8	$3,795,000
Total costs	**$45.1**	**$19,354,000**
Obesity costs	$32.3	$13,834,000
Overweight costs	$12.8	$5,520,000

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

Using NHANES data, we created a representative sample of the employee and covered adult dependents population with obesity in the professional and business services sector. Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits. Using the DPTMM, we simulated clinical outcomes and medical cost savings associated with sustaining body weight loss of 5% to 25% (Exhibit 38 and Exhibit 39).

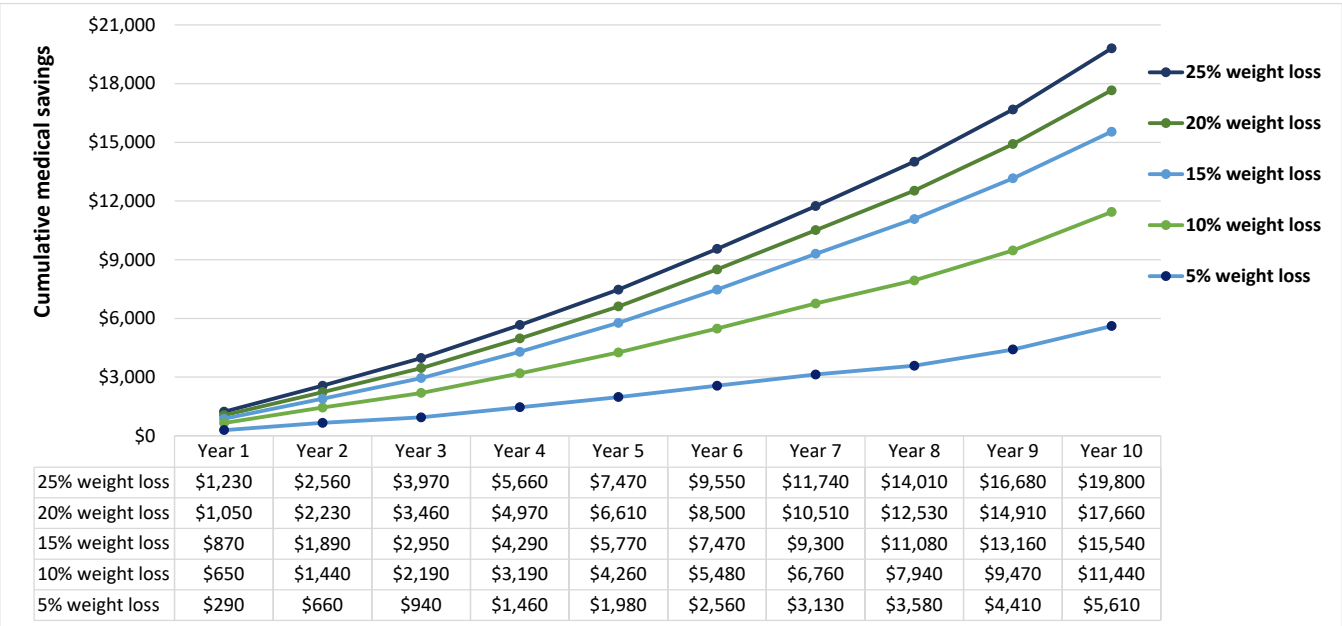
Exhibit 38. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$630	$1,300	$2,070	$3,220	$4,620	$6,240	$7,920	$9,670	$11,730	$13,750
20% weight loss	$600	$1,200	$1,940	$3,020	$4,330	$5,810	$7,390	$9,040	$10,720	$12,340
15% weight loss	$460	$970	$1,560	$2,460	$3,580	$4,910	$6,280	$7,750	$9,230	$10,610
10% weight loss	$260	$550	$900	$1,510	$2,330	$3,270	$4,370	$5,480	$6,620	$7,750
5% weight loss	$160	$390	$660	$1,220	$1,870	$2,510	$3,260	$4,020	$4,620	$5,230

Source: GlobalData Plc.

Exhibit 39. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$1,230	$2,560	$3,970	$5,660	$7,470	$9,550	$11,740	$14,010	$16,680	$19,800
20% weight loss	$1,050	$2,230	$3,460	$4,970	$6,610	$8,500	$10,510	$12,530	$14,910	$17,660
15% weight loss	$870	$1,890	$2,950	$4,290	$5,770	$7,470	$9,300	$11,080	$13,160	$15,540
10% weight loss	$650	$1,440	$2,190	$3,190	$4,260	$5,480	$6,760	$7,940	$9,470	$11,440
5% weight loss	$290	$660	$940	$1,460	$1,980	$2,560	$3,130	$3,580	$4,410	$5,610

Source: GlobalData Plc.

The estimated 5-year aggregate medical cost savings based on different weight loss scenarios is presented for the entire Professional and Business Services sector as well as for a hypothetical employer with 10,000 employees with covered adult

dependents (Exhibit 40.). The 5% weight loss scenario could achieve $13.8 billion in industry savings, while the 25% weight loss scenario could achieve $34.0 billion in savings. For the hypothetical employer, 5% weight loss could achieve $5.9 million in savings while 25% weight loss could achieve $14.6 million in savings.

Exhibit 40. Estimated 5-year Aggregate Medical Cost Savings

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer*
5% weight loss	$13.8	$5,909,000
10% weight loss	$17.1	$7,362,000
15% weight loss	$26.3	$11,311,000
20% weight loss	$31.9	$13,682,000
25% weight loss	$34.0	$14,598,000

Source: GlobalData Plc.

Appendix G: Economic Impact of Excess Weight on the Transportation and Utilities Sector

The transportation and utilities sector, comprising around 7.3 million workers as of October 2023, exhibits certain demographic and health characteristics.[58] In this sector, approximately 75% of workers are male, 24% are aged 55 years or older, and 30% belong to a racial or ethnic minority population.[142] Our analysis of the NHIS indicates that around 36% (2.6 million) of workers in this sector have obesity, notably higher than the 30% prevalence observed across all industries (Exhibit 41 and Exhibit 42). An additional 38% (2.8 million) workers have overweight. To model the impact of obesity and overweight in this sector, we considered sector-specific costs, accounting for variations in workforce demographics, earnings, employer insurance coverage, and occupational risks.

Exhibit 41. Model Parameters for the Transportation and Utilities Sector

Model Input	Parameter	Source
Employment (millions)	7.3	BLS (2023)[58]
Obesity prevalence	36%	NHIS analysis
Overweight prevalence	38%	NHIS analysis
Obesity impact on worker medical costs	$1,544	MEPS analysis
Overweight impact on worker medical costs	$341	MEPS analysis
Obesity impact on dependent medical costs	$1,544	Assumption based on MEPS analysis
Overweight impact on dependent medical costs	$341	Assumption based on MEPS analysis
Health insurance take-up rate (industry average)	77%	KFF (2023)[143]
Health insurance take-up rate (for organizations with 500+ employees)	84%	Calculated from KFF (2023)[143]
Employer % total medical costs (industry average)	60%	Calculated from BLS (2023) [144] and MEPS analysis
Employer % total medical costs (for organizations with 500+ employees)	63%	Calculated from BLS (2023) [144] and MEPS analysis
Percent of covered employees with adult dependent	44%	Calculated from 62% of adults are married or have a partner[77], and 29% of partners have separate coverage[78]
Higher disability costs: Obesity	$1,209	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Higher workers' compensation payments: Obesity	$204	Calculated from Shinde et al. (2023) and NHIS and MEPS analysis[14]
Productivity		
Health-related work absenteeism: Obesity	$2,336	Calculated from Shinde et al. (2023)[14], Strömberg (2017)[16], and NHIS and MEPS analysis
Health-related presenteeism: Obesity	$1,509	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis
Health-related presenteeism: Overweight	$709	Calculated from Strömberg (2017)[16] and NHIS and CPS analysis

The total cost of excess body weight in this sector is estimated to be $24.0 billion in 2023, including $20.5 billion related to obesity and $3.5 billion related to overweight. Among a hypothetical employer with 10,000 employees, the total cost of excess body weight exceeds $32.9 million, including nearly $28.1 million related to obesity and $4.8 million related to

overweight. However, employers do not bear the total cost. Among higher medical costs for employees and dependents, about $5.0 million is costs to the employer, nearly $4.4 million is costs to employees in the form of insurance premiums and out-of-pocket expenses, and nearly $1.8 million is costs to another entity such as when expenses are covered under the insurance of the workers' spouse. The productivity loss from absenteeism and presenteeism is approximately $16.7 million. While employers shoulder the majority of this cost, it's plausible that employees also bear some of it through reduced earnings.

Exhibit 42. Impacts of Obesity and Overweight on the Transportation and Utilities Sector in 2023

Model Component	Industry Total (#, $Billion)	Hypothetical Employer
Total employees	7,295,700	10,000
Employees with obesity	2,600,000	3,630
Employees with overweight	2,800,000	3,810
Higher direct costs		
Medical costs		
Employees with obesity covered by employer's plan	$3.1	$4,713,000
Employees with overweight covered by employer's plan	$0.7	$1,091,000
Dependents with obesity covered by employer's plan	$1.4	$2,075,000
Dependents with overweight covered by employer's plan	$0.3	$458,000
Employees and dependents with obesity not covered by employer's plan	$2.1	$2,290,000
Employees and dependents with overweight not covered by employer's plan	$0.5	$515,000
Total	**$8.1**	**$11,142,000**
Employer costs	$3.3	$5,025,000
Employee costs	$3.2	$4,361,000
Other payer costs	$1.6	$1,756,000
Disability costs (short term plus long term)	$3.2	$4,389,000
Workers' compensation	$0.5	$740,000
Productivity		
Absenteeism attributed to obesity	$6.2	$8,478,000
Presenteeism attributed to obesity	$4.0	$5,477,000
Presenteeism attributed to overweight	$2.0	$2,698,000
Total costs	**$24.0**	**$32,924,000**
Obesity costs	$20.5	$28,162,000
Overweight costs	$3.5	$4,762,000

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

Using NHANES data, we created a representative sample of the employee and covered adult dependents population with obesity in the transportation and utilities sector. Weight loss is one component of treating obesity, with weight loss contributing to improvements in blood pressure, cholesterol levels, blood sugar levels, and other health benefits. Using the DPTMM, we simulated clinical outcomes and medical cost savings associated with sustaining body weight loss of 5% to 25% (Exhibit 43 and Exhibit 44).

Exhibit 43. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Obesity

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$690	$1,510	$2,590	$3,950	$5,310	$6,710	$8,260	$10,120	$12,370	$14,370
20% weight loss	$700	$1,510	$2,610	$3,930	$5,180	$6,490	$7,810	$9,380	$11,280	$12,900
15% weight loss	$500	$1,050	$1,880	$2,970	$4,000	$5,060	$6,360	$7,880	$9,660	$11,350
10% weight loss	$400	$880	$1,630	$2,570	$3,460	$4,340	$5,520	$6,820	$8,270	$9,640
5% weight loss	$210	$550	$1,040	$1,650	$2,230	$2,800	$3,550	$4,330	$5,160	$5,760

Source: GlobalData Plc.

Exhibit 44. Estimated Aggregate Medical Savings Due to Weight Loss per Individual with Class III Obesity

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
25% weight loss	$1,010	$1,930	$3,290	$4,960	$7,330	$10,050	$12,540	$15,360	$18,370	$21,910
20% weight loss	$920	$1,700	$2,940	$4,430	$6,660	$9,130	$11,410	$14,120	$17,070	$20,310
15% weight loss	$840	$1,480	$2,600	$3,910	$6,010	$8,220	$10,290	$12,890	$15,750	$18,690
10% weight loss	$620	$970	$1,880	$2,920	$4,660	$6,520	$8,280	$10,650	$12,950	$15,230
5% weight loss	$390	$470	$730	$1,330	$2,620	$3,690	$4,970	$6,290	$7,440	$8,510

Source: GlobalData Plc.

The estimated 5-year aggregate medical cost savings based on different weight loss scenarios is presented for the entire Transportation and Utilities sector as well as for a hypothetical employer with 10,000 employees with covered adult dependents (Exhibit 45.). The 5% weight loss scenario could achieve $8.5 billion in industry savings, while the 25% weight loss scenario could achieve $20.2 billion in savings. For the hypothetical employer, 5% weight loss could achieve nearly $11.7 million in savings while 25% weight loss could achieve nearly $27.8 million in savings.

Exhibit 45. Estimated 5-year Aggregate Medical Cost Savings

Weight Loss Scenarios	Industry Total ($Billion)	Hypothetical Employer
5% weight loss	$8.5	$11,656,000
10% weight loss	$13.2	$18,085,000
15% weight loss	$15.3	$20,908,000
20% weight loss	$19.8	$27,076,000
25% weight loss	$20.2	$27,755,000

Source: GlobalData Plc.

Appendix H: State Variation in Cost of Excess Weight to Employers

National assessments of the economic impacts of obesity can pose challenges in integrating into business decisions due to variations in the prevalence of obesity, healthcare costs, and labor costs across different regions. For an organization with 10,000 employees, the projected additional costs associated with obesity and overweight amount to approximately $24.82 million (Exhibit 46). The highest cost state is Hawaii ($37.58M) and the lowest cost state is Colorado ($22.68M). The elevated costs in Hawaii can be attributed to 26% higher healthcare costs and a 79% higher overall cost of living (used as a proxy for state variation in compensation costs) relative to the national average, even though the prevalence of obesity is only 85% of the national average.[100,d] In contrast, lower costs for employers in Colorado are influenced by the obesity rate being only 78% of the national average, with healthcare costs marginally lower (1%) and overall cost of living slightly higher (7%) than the national average.

[d] The obesity and overweight prevalence numbers are calculated based on a population age 18 to 64 who are privately insured.

Exhibit 46. Cost of Excess Body Weight per Organization with 10,000 Workers, by State ($Million)

	Higher Health Care Costs				Higher Disability, Worker's Compensation, and Productivity Costs					Total
State	Total	Total for Employers	Total for Employees	Total for Other Insurers	Disability	Worker's Compensation	Absenteeism	Presenteeism (Obesity)	Presenteeism (Overweight)	
Alabama	$8.95	$3.88	$3.51	$1.56	$1.96	$0.33	$5.17	$7.15	$2.63	$26.18
Alaska	$13.75	$5.96	$5.39	$2.40	$2.48	$0.42	$6.55	$9.06	$3.75	$36.02
Arizona	$8.67	$3.76	$3.40	$1.51	$2.13	$0.36	$5.62	$7.78	$3.21	$27.76
Arkansas	$9.12	$3.95	$3.58	$1.59	$2.00	$0.34	$5.28	$7.31	$2.59	$26.63
California	$8.38	$3.63	$3.29	$1.46	$2.23	$0.38	$5.88	$8.13	$4.24	$29.23
Colorado	$7.19	$3.12	$2.82	$1.26	$1.65	$0.28	$4.36	$6.03	$3.17	$22.68
Connecticut	$8.88	$3.85	$3.48	$1.55	$1.98	$0.33	$5.22	$7.22	$3.45	$27.07
Delaware	$10.63	$4.61	$4.17	$1.86	$2.23	$0.38	$5.88	$8.14	$2.82	$30.08
District of Columbia	$7.55	$3.27	$2.96	$1.32	$2.00	$0.34	$5.29	$7.31	$3.78	$26.26
Florida	$8.96	$3.88	$3.51	$1.56	$1.98	$0.33	$5.23	$7.24	$3.01	$26.76
Georgia	$10.10	$4.38	$3.96	$1.76	$1.96	$0.33	$5.18	$7.17	$2.56	$27.31
Hawaii	$9.89	$4.28	$3.88	$1.73	$2.99	$0.50	$7.91	$10.94	$5.35	$37.58
Idaho	$9.10	$3.94	$3.57	$1.59	$1.90	$0.32	$5.03	$6.96	$3.00	$26.31
Illinois	$8.69	$3.76	$3.41	$1.52	$1.77	$0.30	$4.67	$6.46	$2.71	$24.59
Indiana	$9.93	$4.30	$3.90	$1.73	$2.00	$0.34	$5.29	$7.32	$2.54	$27.43
Iowa	$10.23	$4.43	$4.01	$1.79	$1.93	$0.33	$5.09	$7.04	$2.63	$27.24
Kansas	$10.18	$4.41	$3.99	$1.78	$1.93	$0.33	$5.10	$7.06	$2.55	$27.14
Kentucky	$9.75	$4.22	$3.82	$1.70	$2.18	$0.37	$5.77	$7.98	$2.80	$28.85
Louisiana	$11.14	$4.83	$4.37	$1.95	$2.16	$0.36	$5.72	$7.91	$2.65	$29.94
Maine	$10.29	$4.46	$4.03	$1.80	$2.18	$0.37	$5.75	$7.95	$3.04	$29.57
Maryland	$9.80	$4.25	$3.84	$1.71	$2.36	$0.40	$6.23	$8.62	$3.34	$30.74
Massachusetts	$8.22	$3.56	$3.23	$1.44	$2.24	$0.38	$5.93	$8.20	$4.19	$29.16
Michigan	$9.67	$4.19	$3.79	$1.69	$1.99	$0.34	$5.25	$7.27	$2.55	$27.06
Minnesota	$9.48	$4.11	$3.72	$1.66	$1.74	$0.29	$4.60	$6.36	$2.88	$25.35
Mississippi	$12.10	$5.24	$4.74	$2.11	$2.26	$0.38	$5.98	$8.27	$2.37	$31.36
Missouri	$9.06	$3.92	$3.55	$1.58	$1.89	$0.32	$4.99	$6.89	$2.55	$25.69
Montana	$8.23	$3.57	$3.23	$1.44	$1.85	$0.31	$4.88	$6.74	$3.26	$25.27

	Higher Health Care Costs				Higher Disability, Worker's Compensation, and Productivity Costs					Total
State	Total	Total for Employers	Total for Employees	Total for Other Insurers	Disability	Worker's Compensation	Absenteeism	Presenteeism (Obesity)	Presenteeism (Overweight)	
Nebraska	$10.18	$4.41	$3.99	$1.78	$1.98	$0.33	$5.22	$7.22	$2.70	$27.63
Nevada	$8.28	$3.59	$3.25	$1.45	$2.00	$0.34	$5.27	$7.29	$3.09	$26.27
New Hampshire	$9.75	$4.23	$3.82	$1.70	$2.23	$0.38	$5.89	$8.14	$3.31	$29.70
New Jersey	$8.14	$3.53	$3.19	$1.42	$1.90	$0.32	$5.02	$6.95	$3.22	$25.55
New Mexico	$9.01	$3.90	$3.53	$1.57	$1.83	$0.31	$4.83	$6.68	$2.95	$25.59
New York	$8.90	$3.86	$3.49	$1.55	$2.21	$0.37	$5.83	$8.07	$3.67	$29.04
North Carolina	$10.27	$4.45	$4.03	$1.79	$1.97	$0.33	$5.19	$7.18	$2.88	$27.82
North Dakota	$11.71	$5.07	$4.59	$2.04	$2.09	$0.35	$5.53	$7.65	$2.65	$29.99
Ohio	$10.50	$4.55	$4.12	$1.83	$2.03	$0.34	$5.37	$7.43	$2.71	$28.39
Oklahoma	$10.14	$4.39	$3.98	$1.77	$2.02	$0.34	$5.34	$7.38	$2.54	$27.77
Oregon	$9.46	$4.10	$3.71	$1.65	$2.09	$0.35	$5.52	$7.63	$3.25	$28.29
Pennsylvania	$8.92	$3.86	$3.50	$1.56	$1.95	$0.33	$5.14	$7.12	$2.70	$26.15
Rhode Island	$9.62	$4.17	$3.77	$1.68	$2.14	$0.36	$5.65	$7.82	$3.29	$28.88
South Carolina	$9.39	$4.07	$3.68	$1.64	$2.05	$0.35	$5.42	$7.49	$2.78	$27.46
South Dakota	$9.41	$4.08	$3.69	$1.64	$1.84	$0.31	$4.87	$6.74	$2.77	$25.95
Tennessee	$9.55	$4.14	$3.74	$1.67	$2.09	$0.35	$5.51	$7.63	$2.61	$27.74
Texas	$9.68	$4.20	$3.80	$1.69	$2.05	$0.35	$5.41	$7.49	$2.76	$27.74
Utah	$8.20	$3.55	$3.21	$1.43	$1.99	$0.34	$5.26	$7.27	$2.91	$25.96
Vermont	$8.46	$3.67	$3.32	$1.48	$1.93	$0.32	$5.09	$7.04	$3.21	$26.05
Virginia	$9.38	$4.07	$3.68	$1.64	$1.99	$0.34	$5.25	$7.26	$3.00	$27.20
Washington	$9.85	$4.27	$3.86	$1.72	$2.02	$0.34	$5.34	$7.39	$3.50	$28.44
West Virginia	$11.49	$4.98	$4.50	$2.01	$2.19	$0.37	$5.79	$8.00	$2.40	$30.23
Wisconsin	$10.76	$4.66	$4.22	$1.88	$2.00	$0.34	$5.28	$7.30	$2.71	$28.39
Wyoming	$8.93	$3.87	$3.50	$1.56	$1.76	$0.30	$4.65	$6.43	$2.76	$24.83
U.S.	$9.27	$4.02	$3.64	$1.62	$1.97	$0.33	$5.21	$7.20	$2.94	$26.93

Source: GlobalData Plc. Numbers might not precisely sum to totals due to rounding.

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Technical Notes

[i] The Disease Prevention & Treatment Microsimulation Model (DPTMM) is a Markov-based microsimulation model utilized to estimate both clinical and economic outcomes for populations affected by obesity. This model predicts the annual occurrence of diseases and corresponding healthcare expenditures based on factors such as age, sex, race, Hispanic ethnicity, and biometric measurements including BMI, blood glucose level, blood pressure levels, total cholesterol level, and high-density cholesterol level. Additional risk factors modeled include smoking status and the presence of obesity-related comorbidities such as type 2 diabetes, hypertension, ischemic heart disease, congestive heart failure, history of stroke, history of myocardial infarction, and chronic kidney disease, among others.
To project the potential clinical and economic benefits of weight loss, evidence-based scenarios were simulated using the model. The first scenario, known as the usual care scenario, incorporates each individual's annual changes in BMI following the natural aging process, derived from the analysis of public survey data and published references. The counterfactual scenarios, the weight loss scenarios, incorporate actual and simulated changes in body weight and other biometric measurements during the first year, which are then maintained from the second year through the tenth year. The simulation model employs prediction equations that utilize these biometric changes as inputs to project the onset of modeled complications and the corresponding changes in direct medical costs over the next decade. By comparing the simulated health and economic outcomes between scenarios, the potential benefits of weight loss can be assessed.
[ii] A population sample file was created by combining state-level data from the Behavioral Risk Factor Surveillance System (BRFSS) from 2020-2021 with additional biometric and other information from matched individuals in the National Health and Nutrition Examination Survey (NHANES) from 2014-2020. The matching process was based on a 1:1 match using propensity scores derived from risk factors such as age group, gender, race/ethnicity, insurance type, and body weight category. Each merged record in the sample file includes comprehensive data on demographics, biometric parameters, smoking status, and a history of various disease conditions. This combined dataset allows for a more comprehensive analysis and understanding of the population under study.

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