Actor portrayal.

the weigh forward

MODULE 1

Why obesity management matters to your organization

A new understanding of obesity guidelines, obesity management, and anti-obesity medications (AOMs)

Obesity is a chronic disease. Previously, obesity was viewed as just a lifestyle issue

Actor portrayal.

"Our AMA recognizes obesity as a disease state with multiple pathophysiological aspects requiring a range of interventions to advance obesity treatment and prevention."[1]

American Medical Association (AMA)

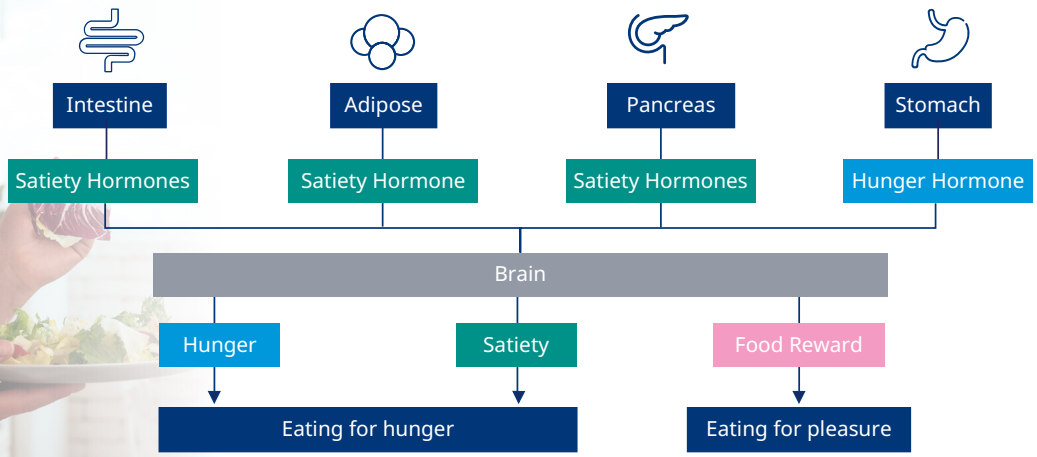
"Obesity is a complex, multifactorial condition characterized by excess body fat. It must be viewed as a chronic condition that essentially requires perpetual care, support, and follow-up. Obesity causes many other diseases, and it warrants recognition by healthcare providers and payers."[2]

American Association of Clinical Endocrinology/ American College of Endocrinology Obesity Task Force

National organizations recognize obesity as a multifaceted, chronic disease and a significant threat to public health.[1-3] Obesity is an excess accumulation of adipose (fat) tissue that may impair health. Its presence can be estimated by a body mass index ≥30 kg/m^2 in many populations.[4]

Actor portrayal.

Appetite regulation is affected by hormones signaling from the body to the brain[5-9]



Appetite regulation results from complex communication between the gastrointestinal (GI) tract, adipose tissue, and the nervous system.[10]

Actor portrayal.

Metabolic adaptations can complicate obesity management[11,12]

Multiple factors affect weight management. For many people with obesity, lifestyle modifications alone are not enough to maintain long-term weight reduction and there may be a gradual weight regain over time.[3,13]

Multiple factors affect weight management[12,14-16]:

- Appetite signals
- Behavior
- Genetics
- Environment

In people with obesity, the body will try to put the weight back on for at least 12 months after weight reduction.[12]

Appetite signals

- Multiple hormonal signals influence appetite[17]
- When weight is lost through caloric restriction, the body increases the hunger hormone and decreases fullness hormones[12]
- Hormonal adaptations in response to weight reduction favor weight regain[17]

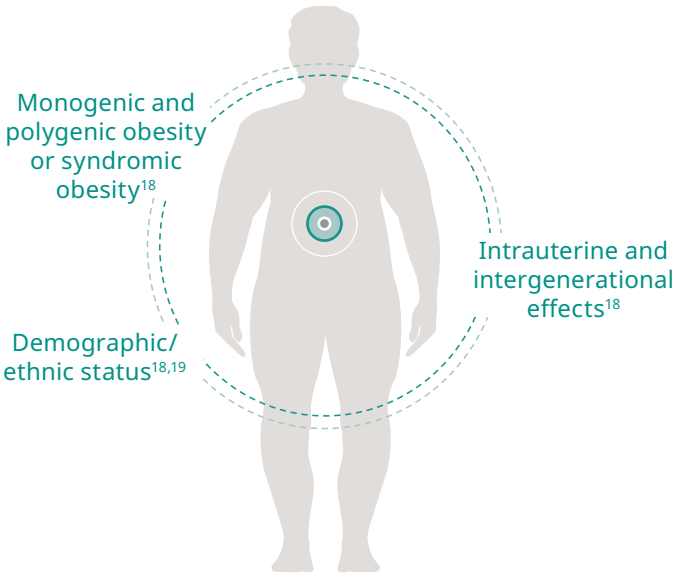
Hormones[17]	Food intake[17,a]	Site of secretion[17]
Ghrelin	↑	Stomach
GLP-1	↓	Intestines
PYY	↓	Intestines
CCK	↓	Small intestine
OXM	↓	Intestines
Amylin	↓	Pancreas
PP	↓	Pancreas

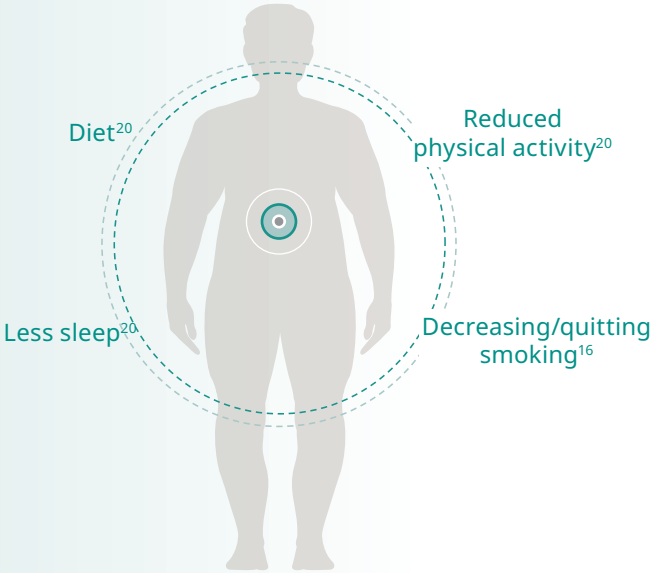
[a]Arrows indicate whether the particular hormone encourages increased or decreased food intake.
CCK=cholecystokinin; GLP-1=glucagon-like peptide 1; OXM=oxyntomodulin; PP=pancreatic polypeptide; PYY=peptide tyrosine-tyrosine.

3

Genetics

- Genes may play an important role in who is impacted by obesity[14,15]
- A person's genetics may determine the extent to which external factors impact their weight[14]



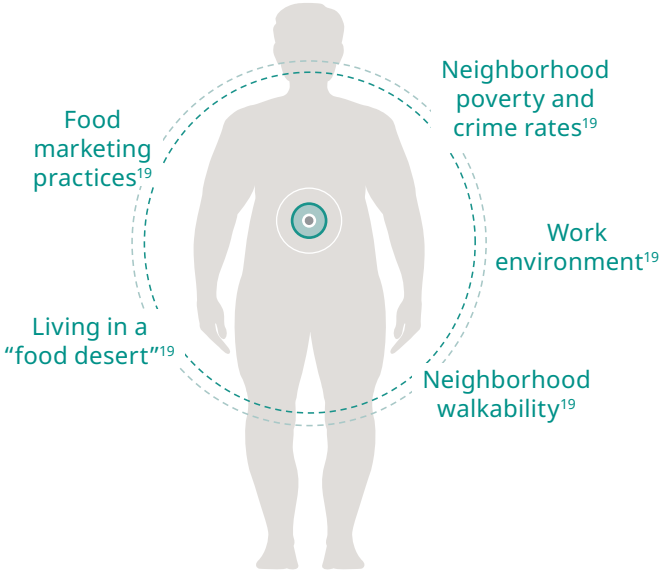


Behavior

- Diet, not enough sleep, lack of physical activity, and smoking status may be contributing factors[16]

Environment

- Having healthy food may be challenging (eg, location, price, time to prepare), which may result in buying more convenient, fatty, and calorie-dense foods. Some individuals have no place to exercise[15,16]



Actor portrayal.

Obesity is classified as BMI ≥30 kg/m^2 and is often associated with weight-related comorbidities[3]

BMI is the primary method for identifying people with obesity or overweight. It provides a more accurate measure of total body fat compared with body weight alone.[21]

Assessing obesity in a clinical setting is often done with the following practical tools[21]:

- BMI
- Waist Circumference

Although other methods of evaluating body fat exist, BMI, along with clinical assessment, is still used to evaluate patients for obesity treatment options.[3,22]

Classification of overweight and obesity[3]

BMI	25-29.9 kg/m^2	30-34.9 kg/m^2	35-39.9 kg/m^2	≥40 kg/m^2
	Overweight	Obesity Class I	Obesity Class II	Obesity Class III

In most EHRs, a patient's BMI is autogenerated from height and weight measurements obtained during the visit[23]

- Diagnoses of obesity are always clinically significant and should always be reported through coding
- Physicians generally do not report a diagnosis of overweight without the presence of weight-related comorbidities

EHR=electronic health record.

BMI is the primary method for identifying people with obesity or overweight[21]

BMI provides a more accurate assessment of total body fat compared with body weight alone

Calculating BMI[24]:

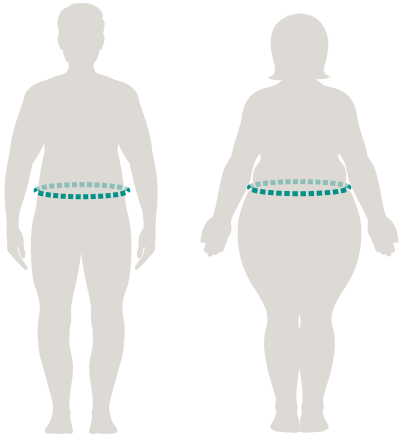
$$\frac{\text{Weight (kg)}}{\text{Height squared (m}^2\text{)}} = \text{BMI (kg/m}^2\text{)}$$

Interpretation of BMI should take into consideration patient-specific factors such as age, gender, ethnicity, hydration, and other factors. BMI cannot accurately estimate body fat in some people, including persons who are very muscular or who have lost muscle mass.[21]

The role of waist circumference[21]

Waist circumference can be measured to assess risk for obesity-related comorbidities in patients with BMI <35 kg/m^2

Measuring waist circumference is a useful method to evaluate a patient's abdominal fat before and during obesity treatment



Examples of BMI Ranges[3,25]

Based on average national heights for men and women in the United States, the table below shows examples of weight correlated with BMI ranges[a]

Class	BMI	Men Average Height: 69.0 inches (5'9")	Women Average Height: 63.5 inches (5'3.5")
Normal weight	≥18.5 kg/m^2 to 24.9 kg/m^2	≥125 lbs to 169 lbs	≥106 lbs to 142 lbs
Overweight	≥25 kg/m^2 to 29.9 kg/m^2	≥169 lbs to 202 lbs	≥143 lbs to 171 lbs
Obesity Class I	≥30 kg/m^2 to 34.9 kg/m^2	≥203 lbs to 236 lbs	≥172 lbs to 200 lbs
Obesity Class II	≥35 kg/m^2 to 39.9 kg/m^2	≥237 lbs to 270 lbs	≥201 lbs to 229 lbs
Obesity Class III	≥40 kg/m^2	≥271 lbs	≥229 lbs

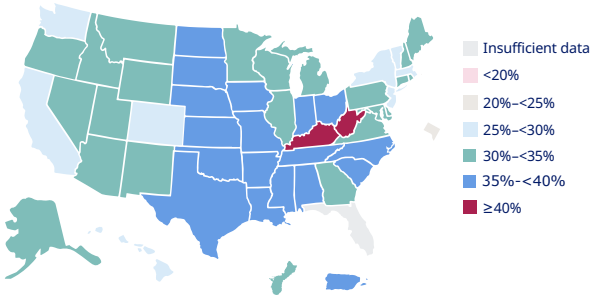
[a]Adults aged 20 and older.

Actor portrayal.

Obesity is highly prevalent within your ecosystem and the statistics are rising

~108 Million adults have obesity in the United States and the prevalence is expected to keep growing[26-29,a]

Prevalence of obesity (BMI ≥30 kg/m²) among United States adults by state in 2021[30,b]



Explore obesity prevalence by region

By 2030, nearly **1 in 2 adults** in the United States are projected to have obesity (BMI ≥30 kg/m²) and nearly **1 in 4** are projected to have Class II or III obesity (BMI ≥35 kg/m² or ≥40 kg/m²).[28]

Actor portrayal.

Approximately 73% of the adult population have overweight or obesity[31,c,d]

Breakdown by BMI category[31,d,e]

26.0%	31.4%	22.0%	10.5%	8.6%
Normal Weight (BMI ≥18.5 kg/m² to 24.9 kg/m²)	**Overweight** (BMI ≥25 kg/m² to 29.9 kg/m²)	**Obesity Class I** (BMI ≥30 kg/m² to 34.9 kg/m²)	**Obesity Class II** (BMI ≥35 kg/m² to 39.9 kg/m²)	**Obesity Class III** (BMI ≥40 kg/m²)

From 1999-2020 through 2017-2018, the age-adjusted United States obesity prevalence increased from 30.5% to 41.9%. During the same time, the prevalence of severe obesity nearly doubled, from 4.7% to 9.2%.[32]

[a]Adults aged ≥18 years.[27]

[b]Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

[c]Adults aged ≥20 years.

[d]Based on data from 2015-2018.[31]

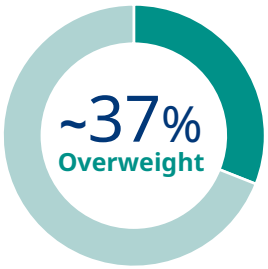
[e]Percentages do not sum to 100 because the percentage of people with BMI <18.5 kg/m² is not shown and the percentage of people with obesity is a subset of the percentage with overweight and obesity.[31]

Actor portrayal.

Regardless of your industry or occupation, obesity and overweight can have an impact on your workforce

Among full-time employees:

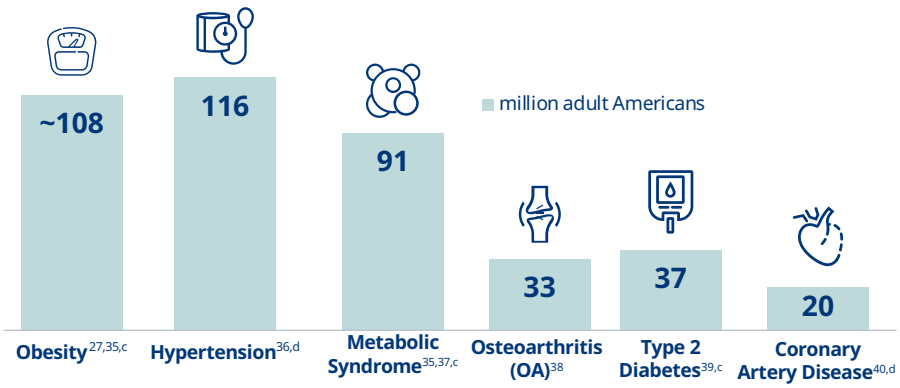
or ~40,110,000
full-time employees have[33,a]
Obesity
(BMI ≥30 kg/m^2)



or ~45,350,000
full-time employees have[33,a]
Overweight
(BMI ≥25 kg/m^2 to 29.9 kg/m^2)

Obesity may be associated with many health complications that can drive up healthcare costs. Obesity can also increase indirect costs such as absenteeism and disability costs.[34]

How does the prevalence of obesity compare with that of other chronic diseases?[b]



Actor portrayal.

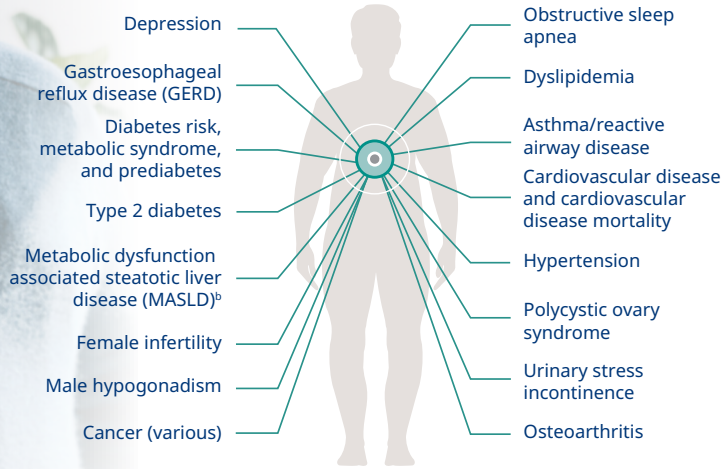
Note that these conditions are **not mutually exclusive**; an individual may have more than one of these conditions at the same time

[a]United States adults aged ≥18 years, as of 2018.
[b]These are approximations based on currently available statistics.
[c]Adults aged ≥18 years.
[d]Adults aged ≥20 years.

Actor portrayal.

The comorbidities of obesity may pose a serious threat to individuals within your organization[41,42,a]

Examples of obesity-related comorbidities[41,42]



According to the Obesity Medicine Association, there may be

>200

COMORBIDITIES ASSOCIATED WITH OBESITY[43]

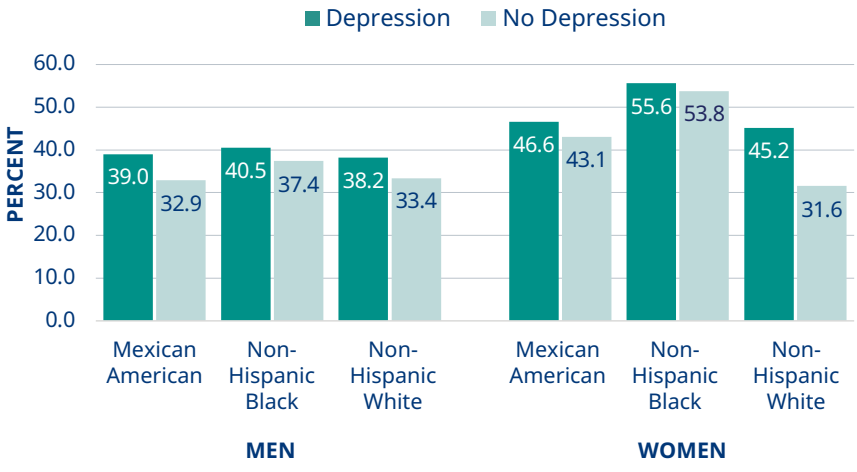
Obesity is a debilitating disease that is likely already impacting the health of people in your organization.

There are also some ways that obesity can impact **mortality** and the way the body responds to **acute illnesses and infection**[44]

DEPRESSION

43% of adults aged ≥20 years in the United States with depression have obesity[45]

Obesity among adults[c] with depression in the United States[45,d]



Which comes first?

Does the impact of overweight lead to depression?

Or does depression itself cause excess weight gain?

The answer may be yes to both.[46]

Both depression and obesity have been associated with many health risks, including cardiovascular disease, diabetes, and functional limitations.[45]

[a]The above list is not exhaustive and is intended to illustrate only a range of key complications.
[b]MASLD was formerly known as non-alcoholic fatty liver disease (NAFLD).
[c]Aged ≥20 years.[45]
[d]Data from National Health and Nutrition Examination Survey, 2005-2010.[45]

OBSTRUCTIVE SLEEP APNEA

Obesity is associated with obstructive sleep apnea (OSA)[a]

What is OSA?[47]

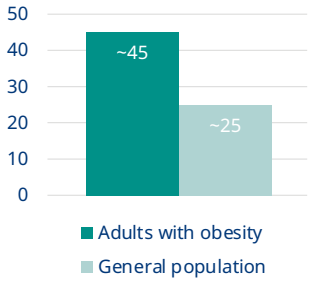
Sleep apnea is a disorder in which people experience disrupted breathing while they are sleeping.

In OSA, disruptive breathing occurs because of a narrow or blocked upper airway.

Obesity and sleep[48]

People who have obesity (BMI ≥30 kg/m^2) have a shorter duration of sleep and twice as many subjective sleep problems compared with people without obesity.

Percentage of adults with OSA[49]



What can be done?

Weight reduction of 10% or more may improve apnea-hypopnea index in OSA.[50]

Increased physical activity and decreased sedentary behavior were associated with lower OSA incidence.[51]

OSA adversely affects multiple organs and systems, and may be associated with cardiovascular disease, hypertension, insulin resistance, systemic inflammation, visceral fat deposition, and dyslipidemia.[49]

DIABETES RISK, METABOLIC SYNDROME, AND PREDIABETES

BMI and/or waist circumference may be associated with risk of metabolic disorders[52,53]

Dyslipidemia[54,55]

Dyslipidemia is one of the most frequent insurance claims related to obesity

Compared with individuals with a normal weight, the risk of developing dyslipidemia is increased for patients with overweight and obesity

56% ↑ overweight

74% ↑ obesity

Type 2 Diabetes

A meta-analysis suggests that obesity increases the risk of T2D **6.7X in men** and **12.4X in women**[56,b]

Overweight or obesity affects **90% of T2D** patients[57]

[a]Obesity is only 1 of the risk factors for OSA.[49]

[b]A meta-analysis was performed using 89 prospective cohort studies with a sample size of at least 200 subjects with risk estimates based on the incidence of disease (7 studies were available for T2D). Incidence rate ratios and risk ratio proportions were used to obtain pooled risk ratios with 95% CIs to provide a review of the incidence of comorbidities related to obesity and overweight.[56]

T2D=type 2 diabetes.

CARDIOVASCULAR DISEASE AND CARDIOVASCULAR DISEASE MORTALITY

Obesity and certain weight-related comorbidities can increase risk of cardiovascular diseases

Obesity contributes to certain cardiovascular risk factors such as dyslipidemia, T2D, and HTN.[58]

People with a BMI of 30 kg/m^2 or greater have an increased risk for developing HTN and CHD.[56]

A meta-analysis established a significant association between overweight and obesity with the incidence of cardiovascular diseases.[56]

Every 5 kg/m^2 increase in BMI is associated with an increased risk of adverse cardiovascular outcomes for the following[59,a]:

CHD	HF	HTN
15%↑	41%↑	49%↑

Overweight and obesity are linked to increased cardiovascular disease risk:

	Obesity increases risk	
CAD	≥1.7x[56,b]	
Stroke	~1.5x[56,b]	Obesity is estimated to impact 18% to 44% of stroke patients[60]

FEMALE INFERTILITY

Obesity is associated with reproductive health issues in women[61]

Potential Complications—Infertility[62,c]

3% increased risk of infertility per 1-unit increase in BMI ≥19.5 kg/m^2

POLYCYSTIC OVARY SYNDROME

Polycystic ovary syndrome (PCOS) is one of the most prevalent endocrine disorders in reproductive-aged women[63]

Data suggest that between **38%** and **88%** of **women with PCOS have obesity or overweight**.[64]

As of 2020, PCOS is associated with **$8 billion in healthcare costs**.[65]

Although clinical efficacy can vary among individuals, even modest reduction of 5% of total body weight may result in clinically meaningful improvements of PCOS symptoms (including restoration of ovulation, normal menstruation, and androgen levels).[41,66]

[a]Analysis was performed using 12 systematic reviews and 53 meta-analyses (including >501 cohort studies) and 12 Mendelian randomization (MR) (informing causality) studies that were published until January 2021 to evaluate the association between obesity-related indices and CVD risks (eg, CHD, HF, HTN, etc). In this review, the all-cause and CVD-specific mortality risks increased with adiposity in cohorts, while there was no causal effect of adiposity on all-cause mortality demonstrated in the MR studies.[59]

[b]A meta-analysis was performed using 89 prospective cohort studies with a sample size of at least 200 subjects. Pooled risk ratios with 95% CIs were used to determine the incidence of comorbidities related to obesity and overweight.[56]

[c]The study's design was a cross-sectional analysis including 3623 adult females using the NHANES database's 2013-2018 cycle. With BMI serving as the independent variable and reproductive status as the dependent variable, the survey's main goal was to investigate the association between infertility and BMI in women of childbearing age. The reproductive health questionnaire (eg, have you ever attempted to become pregnant over a period of at least a year without becoming pregnant?) was used to self-report infertility; a "yes" response indicated "infertile" status, while a "no" response suggested "fertile" status.[62]

CAD=coronary artery disease; CHD=coronary heart disease; CVD=cardiovascular disease; HF=heart failure; HTN=hypertension.

ASTHMA/REACTIVE AIRWAY DISEASE

Obesity affects the mechanics and function of the chest wall and lungs and is associated with various respiratory disorders[67]

Obesity affects ~38% of adults[a] with asthma[68,69,b]					
Increased risk of developing asthma	12%	37%	64%	97%	149%
BMI	25 to <30 kg/m^2	30 to <35 kg/m^2	35 to <40 kg/m^2	40 to <50 kg/m^2	≥50 kg/m^2

Respiratory disorders are costly

Asthma	
Direct costs	$61.9 billion[70,71,c]
Indirect costs	$2.1 billion[71,72,c]

GASTROESOPHAGEAL REFLUX DISEASE (GERD)

GERD affects up to 70% of people with severe obesity[73]

In one analysis comparing people of normal weight, the likelihood of experiencing GERD symptoms was[74,d]:

1.5x greater
People with overweight

2.0x greater
People with obesity

Costs in 2009[e]	
Prevalence among all adults[f]	**18.1% to 27.8%[75]**
Direct costs	**$17.5 billion[71,76]**
Facility charges	$2.2 billion
Physician charges	$1.1 billion
Ambulatory care	$2.0 billion
Prescriptions	$11.1 billion
Indirect costs	**$744 million[71,76]**

Weight reduction of **≥10%** can help reduce GERD symptoms[41]

[a]Aged 18 years and older.[69]

[b]This retrospective cohort study analyzed EHR data from 2012-2013, covering 2.8 million adults with a BMI of ≥23.0 kg/m^2 who were enrolled in 9 different health plans across the United States. The study investigated the association between obesity (body weight), asthma control, and the incidence of adult-onset asthma.[69]

[c]Costs were adjusted for inflation in 2023.

[d]A meta-analysis of published literature spanning from 1966-2004, this study explored the link between obesity (BMI) and GERD symptoms. The analysis was performed using the data from 9 pooled studies identified through a Medline search based on risk estimates and defined criteria for exposure and reporting outcomes.[74]

[e]Costs in 2009 United States dollars (USD) were adjusted for inflation in 2023.

[f]Aged 20-95 years.[75]

METABOLIC DYSFUNCTION-ASSOCIATED STEATOTIC LIVER DISEASE

The risk of developing metabolic dysfunction-associated steatotic liver disease (MASLD) may be increased for patients with obesity[77]

Obesity is independently (ie, irrespective of other metabolic factors) linked with MASLD. People with obesity have a[77,78,a,b,c]

3.5 fold
independently higher relative risk of MASLD compared to lean individuals

1.2x increase in relative risk
of MASLD per 1-unit rise in BMI

Prevalence among United States adults	
MASLD[79]	~25%

Modeling estimates the burden of MASLD per patient per year in the United States to be[80]

$1613

CANCER (VARIOUS)

Obesity and overweight are associated with select cancers throughout the body[81]

Obesity and overweight have been linked with an increased risk of at least 13 types of cancer:

- Esophagus
- Breast
- Colon and rectum
- Endometrium (corpus uterus)
- Gallbladder
- Gastric cardia
- Kidney (renal cell)
- Liver
- Ovary
- Pancreas
- Thyroid
- Meninges
- Multiple myeloma

40% of all cancers diagnosed in 2014 were linked to overweight or obesity

55% of cancers **in women**

24% of cancers **in men**

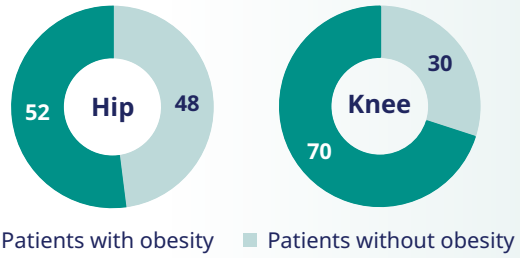
OSTEOARTHRITIS

Obesity contributes to soft-tissue damage and osteoarthritis (OA) of the hip and knees[82]

Obesity may increase the risk of knee OA and may be associated with an increased need for joint replacement surgery.[82,83]

In one study using the Canadian Joint Replacement Registry data, people with Class I obesity[d] were **~8.5x more likely** to require knee replacement surgery compared with the general population.[84]

Patients undergoing total joint arthroplasty in the United States[82]



[a]MASLD was formerly known as non-alcoholic fatty liver disease (NAFLD).[77]

[b]A meta-analysis of 21 cohort studies (13 prospective and 8 retrospective, with a total of 381,655 participants) was performed to assess the MASLD risk associated with obesity or increased BMI. The data was analyzed for pooled relative risks with 95% CIs using a random-effects model.[78]

[c]The data in these studies were utilizing the NAFLD definition.

[d]Class I obesity: BMI 30-34.9 kg/m^2.[84]

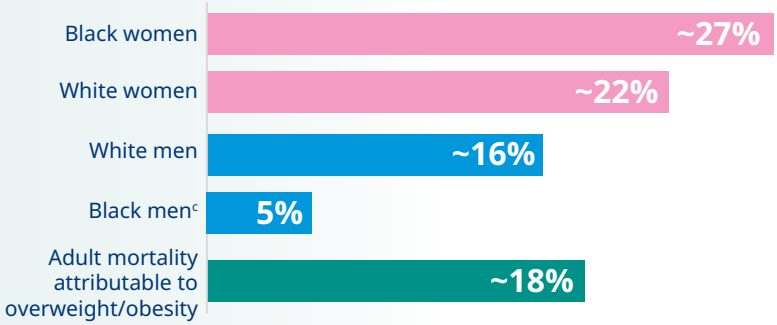
CI=confidence interval.

MORTALITY

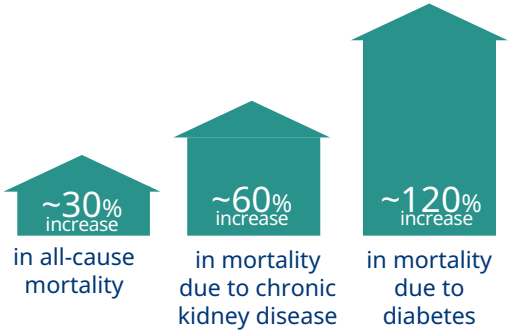
Increased BMI may be associated with adult obesity-related mortality[44]

Overweight and obesity may be associated with ~18%[a] increased mortality for Black and White adults in the United States[44]

Estimated percentage of deaths among adults aged 40 to 84.9 years with overweight and obesity[b]



One analysis of 57 prospective studies found that for every 5 kg/m² BMI increment above 25 kg/m², there was a[15,85]:



Obesity is a chronic disease that may have an incremental impact on lifespan, with younger people with obesity **losing the most years** of their lives (up to 8 years for men with severe obesity aged 20 to 39 years).[86,d] Healthy life years were also lost due to chronic illnesses such as T2D or CVD.[86]

ACUTE ILLNESSES AND INFECTION

Obesity increases the risk of complications and adverse outcomes from acute illnesses and infections

Obesity can contribute to[87]:

- Greater risk of getting certain infectious diseases
- Greater infectious disease severity

The systemic changes that occur in patients with obesity have an impact "across the spectrum of critical illness"[88]

- Pulmonary system
- Nosocomial infections (eg, pneumonia)
- Renal system
- Musculoskeletal system
- Cardiovascular system

When associated with an infection like COVID-19, the odds of needing invasive mechanical ventilation increase with increasing BMI.[89]

Patients hospitalized with COVID-19 who have class II or III obesity are also at an increased risk of death.[89]

Odds ratio (95% CI)	
Overweight	1.27
Obesity class I	1.48
Obesity class II	1.89
Obesity class III	2.31

Obesity could also jeopardize the effectiveness of vaccines

- **COVID-19:** Obesity is significantly associated with decreased antibody response[90,e,f]
- **Influenza:** Obesity blunts immune responses, enabling virus transmission and extending the duration of infection[91]

[a]Aggregated and standardized by race/ethnicity and sex distribution of deaths in the United States among Black and White men and women between 1986 and 2006.[44]

[b]Based on a study of all-cause mortality from 19 consecutive waves of the National Health Interview Survey (NHIS) between 1986 and 2004.[44]

[c]This finding was not significant (CI -6.8, 18.3).[44]

[d]Based on modeling of data from the 2003-2010 NHANES, including 3992 non-Hispanic, White participants.[44]

[e]Studies analyzed antibody response after at least one dose of COVID-19 vaccine, and did not include boosters.[90]

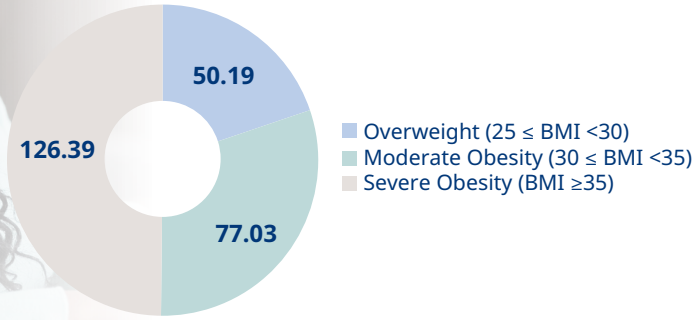
[f]Based on a meta-analysis of 11 studies (n=7956, of which 1869 had obesity).[90]

Actor portrayal.

Obesity is a costly disease

As of 2019, **obesity was associated with $1861 in excess annual medical costs per person** for adults[a] in the United States[92]

Population level excess cost (billions) compared to normal weight by BMI category[92,b]



Medical expenditures associated with obesity increase depending on a number of factors, including BMI.[92]

In major United States industries, direct and indirect costs of obesity increase with rising BMI.[34]

Obesity may be costing your organization more than you know, since obesity itself may **cause or exacerbate** costly conditions.[93]

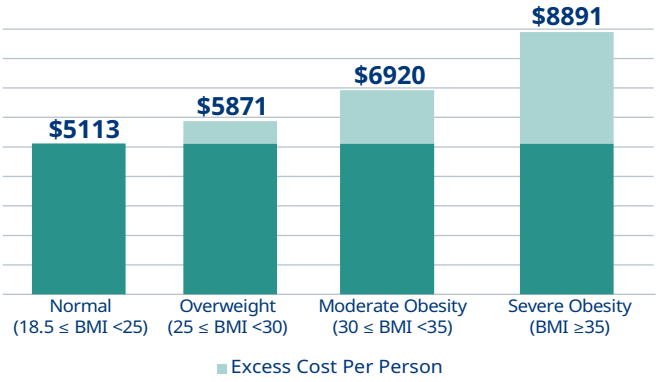
WARD STUDY

Medical expenditures associated with obesity increase depending on degree of obesity[c-e]

Obesity-related costs per person increase depending on a number of factors, including BMI[92]

Age	Around age 30, obesity-related excess costs begin to increase and continue to increase until about age 65[92]
Gender	Medical expenditures are higher in general for adult women[92]
BMI	A one-unit increase in BMI is associated with an additional average cost of $309 annually per person[71,92]

Total and excess annual medical costs associated with overweight and obesity[71,92,f]



[a]Aged 20 years and older.

[b]Population-level costs were estimated by scaling the per-person excess costs using BMI category prevalence estimates from NHANES 2011-2016 and 2019 population estimates of the civilian, non-institutionalized population.[92]

[c]Total cost based on Medical Expenditure Panel Survey data 2011-2016 (n=175,726, adults aged 20 years and older n=139,143).[92]

[d]Total cost per person is a mean of predicted costs for respondents in each BMI category, controlling for age, sex, and other covariates in the two-part model.[92]

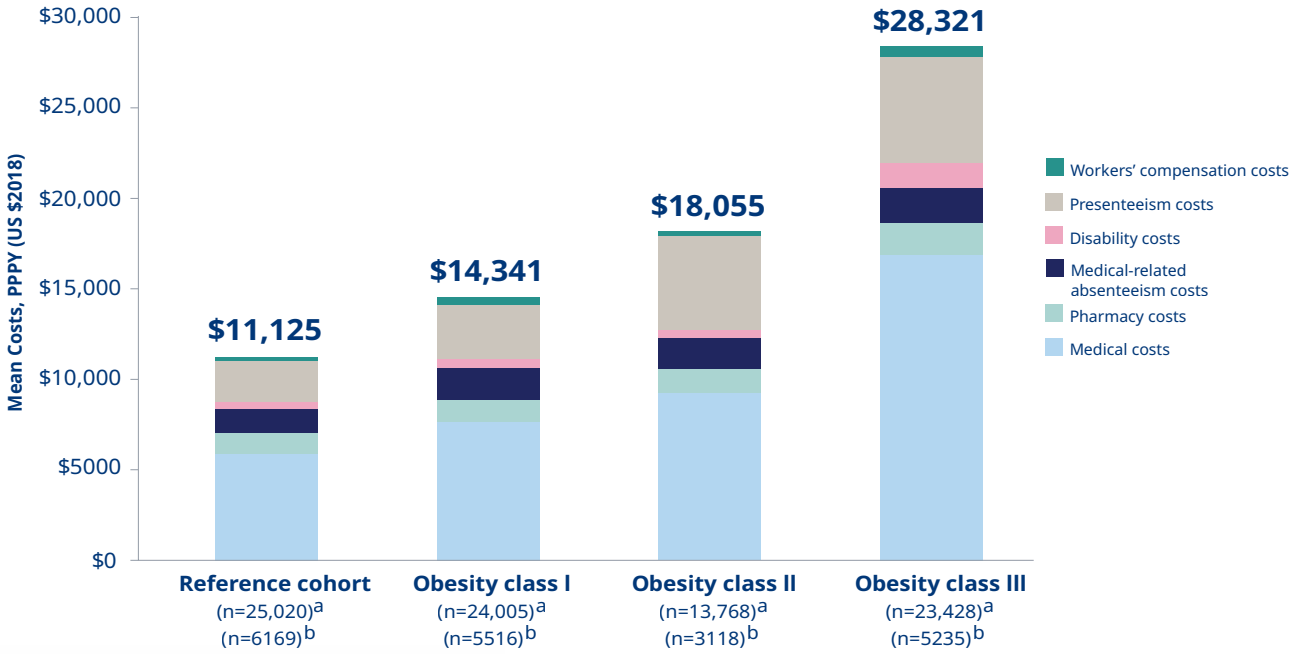
[e]Excess costs were estimated by assuming that all respondents would instead follow the BMI distribution observed in the reference category, then calculating the difference between the current predicted costs and the predicted costs for the reference weight population.

[f]Costs in 2021 USD were adjusted for inflation in 2023.

RAMASAMY STUDY

Obesity was a strong predictor of high direct and indirect costs in a study of major United States industries[34]

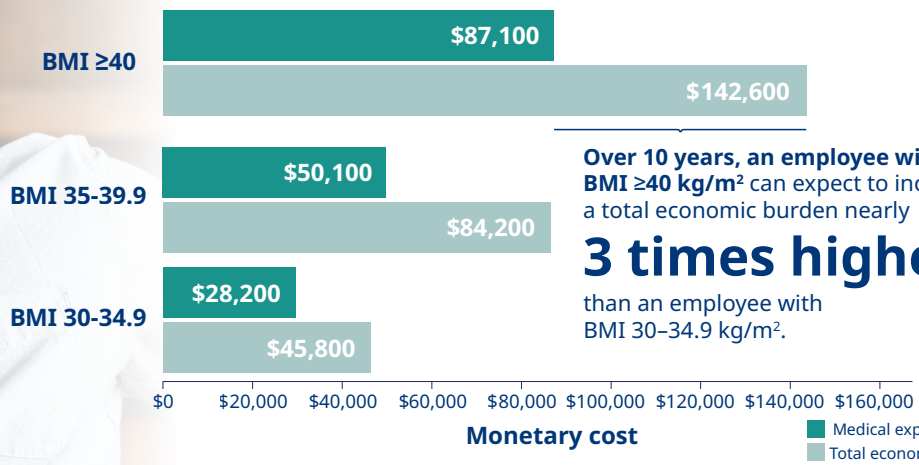
Direct and indirect costs of obesity increase with rising BMI



Actor portrayal.

The economic burden of comorbidities increases exponentially over time[94]

10-year simulated economic outcomes[c]



Over 10 years, an employee with BMI ≥40 kg/m² can expect to incur a total economic burden nearly

3 times higher

than an employee with BMI 30–34.9 kg/m².

[a]Total sample size for direct costs (eg, medical and pharmacy costs).[34]

[b]Sample size for indirect costs (eg, medical-related absenteeism, disability, presenteeism, and worker's compensation), representing the number of employees with work-loss coverage.[34]

[c]Population included 100,000 adults with obesity and 100,000 demographically matched normal-weight adults. Data taken from 2005-2012 NHANES and shown in the graph as cumulative over 10 years and as medical expenditure and total economic burden.[94]

PPPY=per-patient per-year.

Actor portrayal.

The complications of obesity result in significant direct medical costs

Total direct medical costs of obesity-related complications in a hypothetical health plan of 100,000 members[71,95,96,a]

T2D
4030 affected members
~$33,356,661

OA
7792 affected members
~$18,820,186

CAD
1259 affected members
~$6,345,575

The impact of obesity-related comorbidities can be seen in your medical and pharmacy costs.

Obesity is associated with high indirect costs for employers

Absenteeism

- Nationally, presence of obesity **increases job absenteeism by 3.00 workdays** per worker per year (**a 128% increase**). Compared with workers with normal weight, national-level per-worker job absenteeism increases[97,b]:

Class I Obesity	Class II Obesity	Class III Obesity
2.07 days (88.5% ↑)	3.67 days (156.8% ↑)	7.13 days (304.7% ↑)

- The average loss of productivity due to job absenteeism related to obesity ranges from **~$344 to ~$688 per worker annually**, an aggregate national loss of **~$17.0 billion to ~$34.1 billion** per year[71,97,c]

Short-term disability[98]

- Employees with obesity-related complications are nearly **2x as likely** to file claims
- The number of claims can **increase by 37%** as BMI increases

Workers' compensation[99]

- Claims were **160% higher** for employees with obesity[d]

[a]Costs were calculated in 2018 USD and adjusted for inflation in 2023.

[b]Study sample included 50,789 employed adults aged 20 to 65 years with data from the 2001-2016 Medical Expenditure Panel Survey (MEPS), a nationally representative survey of civilian, non-institutionalized adults in the United States. For the purposes of estimating the number of workdays lost, "affected workdays" were those in which respondents lost half or more of the day due to illness and injury.[97]

[c]2017 USD were adjusted for inflation in 2023.

[d]Study specific to the Louisiana Workers' Compensation Corporation Claims Payment Database for open claims. Study included ~2300 injured employees filing workers' compensation claims.[99]

CAD=coronary artery disease; OA=osteoarthritis.

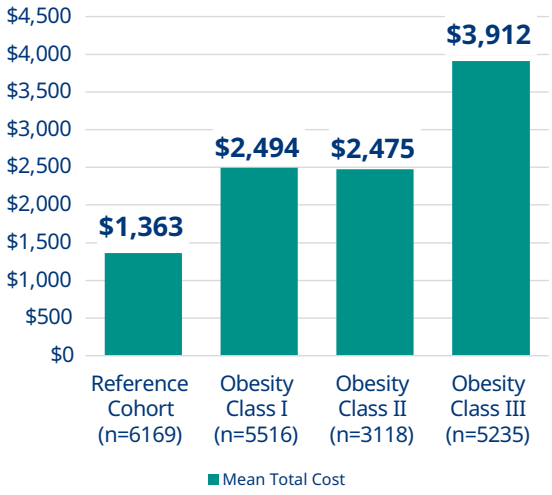
Actor portrayal.

The direct and indirect costs associated with obesity vary across industries[100,a]

In a study of medical, pharmacy, absenteeism, and disability costs, costs increased with higher obesity classes for all industries. Industries studied included:

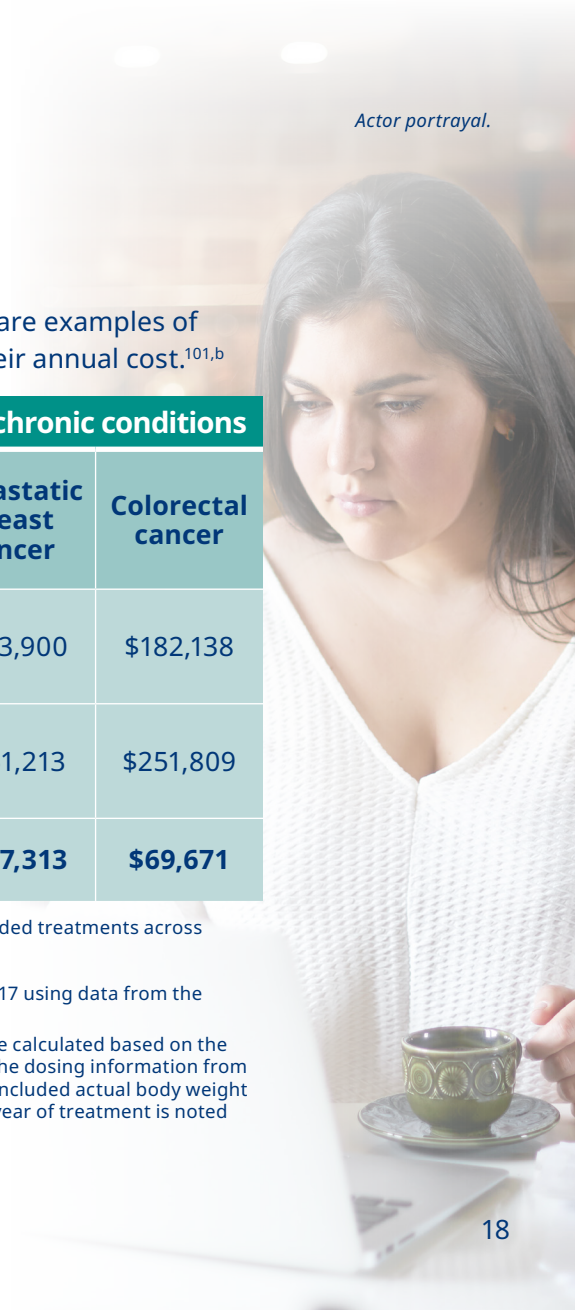
- Government, education, and religious services
- Manufacturing and energy
- Finance and insurance
- Technology
- Transportation
- Healthcare
- Retail stores and consumer goods
- Other (food, entertainment, and other services)

Medical-related absenteeism and disability costs



Compared with employees in the healthcare industry, the following industries had significantly higher direct healthcare costs among employees with obesity:

- Government, education, and religious services
- Other (food, entertainment, and other services)
- Technology



Actor portrayal.

Impact on cost of treatment

Obesity may increase the cost of drugs with weight-based dosing. Here are examples of various weight-based dosage drugs for select chronic conditions and their annual cost.[101,b]

Potential annual costs for weight-based dosage drugs for select chronic conditions

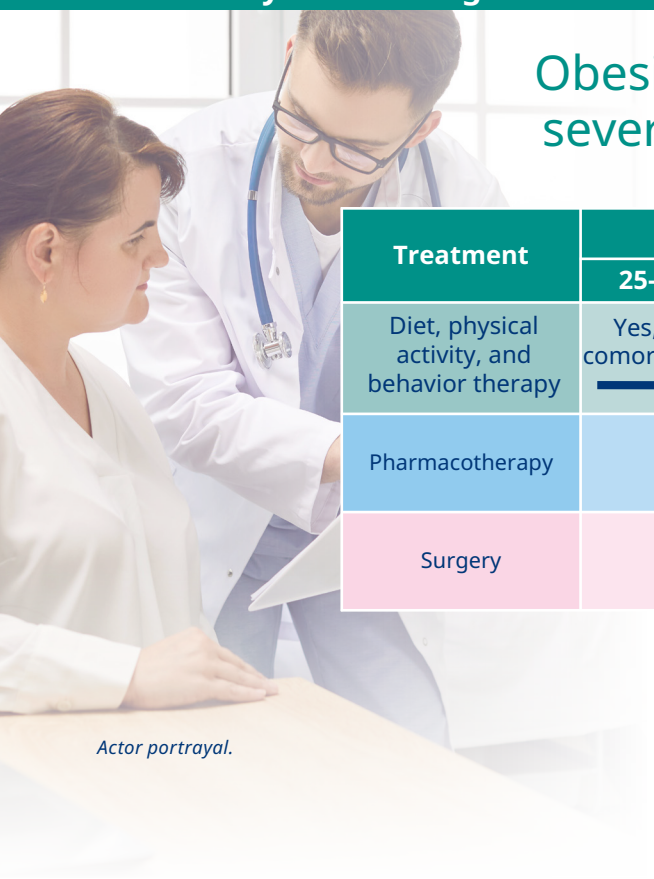
	Routine prophylaxis to prevent or reduce bleeding episodes	Chronic inflammatory demyelinating polyneuropathy	Metastatic breast cancer	Colorectal cancer
Patient A Body weight: 70 kg Height: 170 cm	$643,860	$228,899	$163,900	$182,138
Patient B Body weight: 150 kg Height: 170 cm	$1,379,700	$490,497	$351,213	$251,809
Difference in treating patients A and B	**$735,840**	**$261,599**	**$187,313**	**$69,671**

The methodology for selecting drugs in this category involved considering weight-based dosed branded treatments across various clinical categories.

[a]A retrospective longitudinal cohort study of 39,196 employees was conducted between 2010 and 2017 using data from the Optum Health Reporting and Insights employer claims database. Costs are reported in 2018 USD.[100]

[b]For estimation purposes only. A single product in each category was selected. The annual costs were calculated based on the September 2023 wholesale acquisition costs (WAC) of the selected medications from Redbook and the dosing information from the package inserts as of February 2024 of the selected medications. The inputs for the calculation included actual body weight and cost per mg or mL. The annual cost per patient was determined, and the difference in cost of 1 year of treatment is noted between Patient A and Patient B.

GERS=government, education, and religious services.



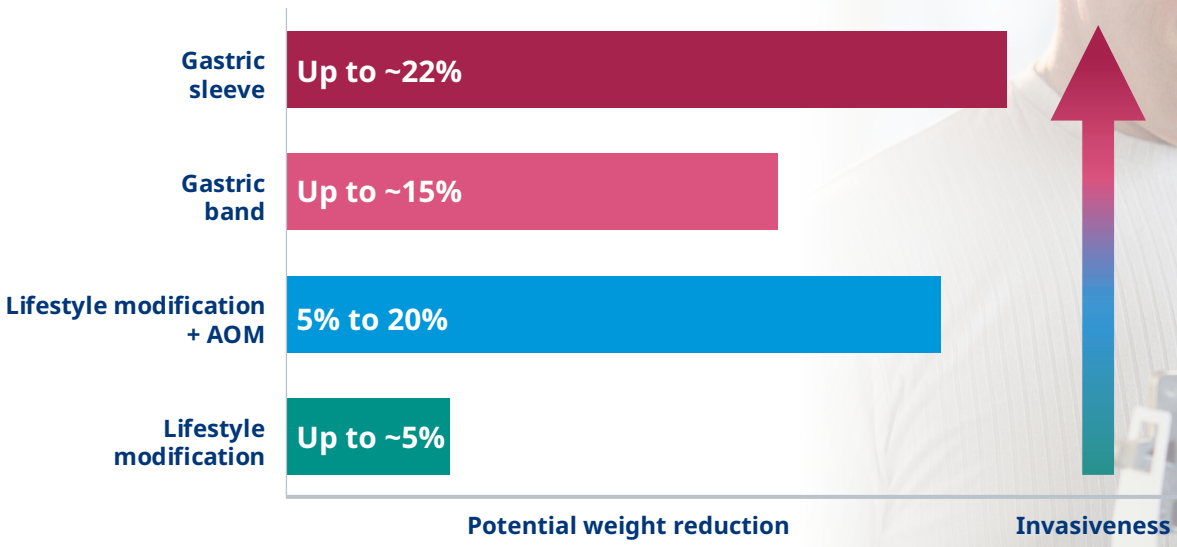
Actor portrayal.

Obesity management may require several treatment approaches[3,22,a]

Treatment	BMI category (kg/m²)				
	25-26.9	27-29.9	30-34.9	35-39.9	≥40
Diet, physical activity, and behavior therapy	Yes, with comorbidities	Yes	Yes	Yes	Yes
Pharmacotherapy		Yes, with comorbidities	Yes	Yes	Yes
Surgery			Yes, with comorbidities	Yes	Yes

Providing a comprehensive range of weight-management options may help meet the needs of individuals with obesity

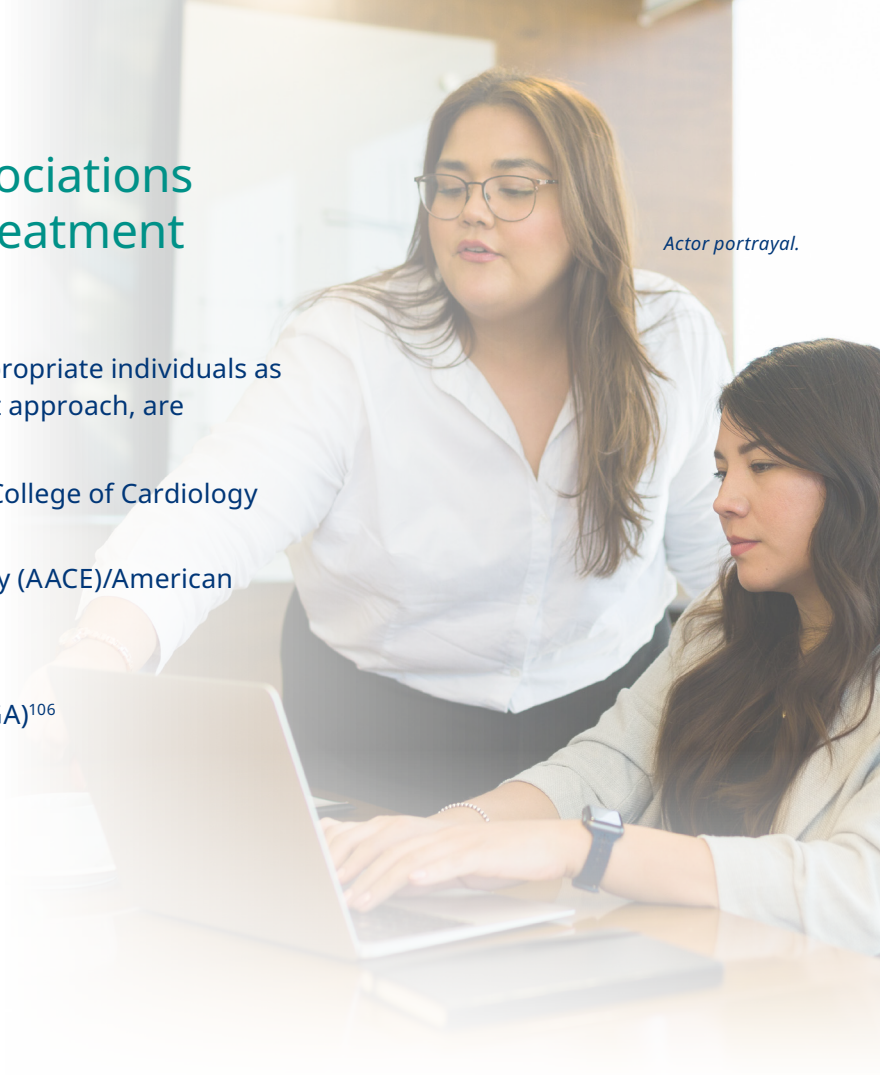
Available treatments for obesity vary in indication, effectiveness, and invasiveness[3,41,102-104]



Actor portrayal.

[a]"Yes" alone means that the treatment is indicated regardless of presence or absence of comorbidities. The solid arrow signifies the point at which treatment is initiated.

Multiple major medical associations support using AOMs in a treatment approach for obesity



Actor portrayal.

AOMs, along with lifestyle modifications for appropriate individuals as a part of a comprehensive obesity management approach, are indicated by the following societies:

- American Heart Association (AHA)/American College of Cardiology (ACC)/The Obesity Society (TOS)[3]
- American Association of Clinical Endocrinology (AACE)/American College of Endocrinology (ACE)[41]
- American Medical Association (AMA)[105]
- American Gastroenterological Association (AGA)[106]

Actor portrayal.

Guidelines from AACE/ACE agree on AOM recommendations[41]

AOMs are supported by AACE/ACE as an adjunct to lifestyle therapy in 3 situations[41]:

- When individuals experience failure on lifestyle therapy alone
- When individuals with overweight and at least 1 weight-related comorbidity or obesity experience weight regain after initial success on lifestyle therapy alone
- When individuals with overweight and at least 1 weight-related comorbidity or obesity experience weight-related complications (particularly if severe)

AGA GUIDELINES

The AGA recommends adding AOMs to lifestyle interventions over continuing lifestyle interventions alone[106]

The current AGA recommendations on pharmacological interventions for management of obesity suggest:

- Adding an AOM to lifestyle interventions over continuing lifestyle interventions alone in adults with obesity or overweight with weight-related complications who have had an inadequate response to lifestyle interventions alone

- AOMs generally need to be used chronically
- The selection of the medication or intervention should be based on the clinical profile and needs of the patient, including (but not limited to):
  - Comorbidities
  - Patient preferences
  - Costs
  - Access to the therapy

Actor portrayal.

The AMA supports health insurance coverage parity for evidence-based treatments for obesity[105]

The AMA recognizes that:

- The cost of weight-reduction medication can be a significant access barrier for people with obesity unless their health plan provides coverage
- Insurance coverage barriers limit broad access to medications
- Providing evidence-based treatment options, including AOMs, aligns with a comprehensive approach to manage obesity

The AMA's policy includes coverage of FDA-approved medications **without exclusions or additional carve-outs**.

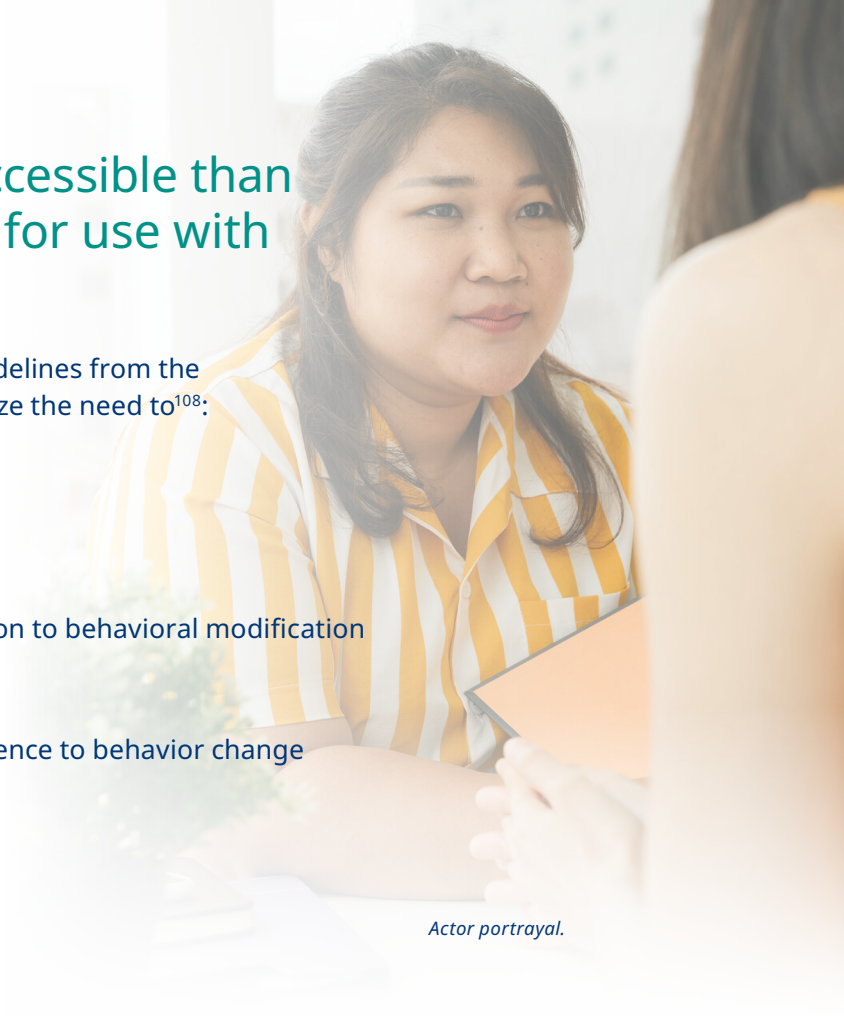
"The AMA will urge health insurers to provide coverage of available FDA-approved weight-loss medications…to demonstrate a commitment to the health and well-being of our patients."

AMA Trustee Bobby Mukkamala, M.D.

Currently, AOMs are more accessible than in the past and are intended for use with lifestyle modification[107,108]

The current Endocrine Society Clinical Practice Guidelines from the Pharmacological Management of Obesity emphasize the need to[108]:

- Manage obesity as a medical condition
- Recommend pharmacotherapy in addition to behavioral modification
- Highlight how AOMs may amplify adherence to behavior change



Actor portrayal.

Actor portrayal.

FOR THE FIRST TIME IN 15 YEARS,

Adolescent treatment guidelines from the AAP have been updated[109]

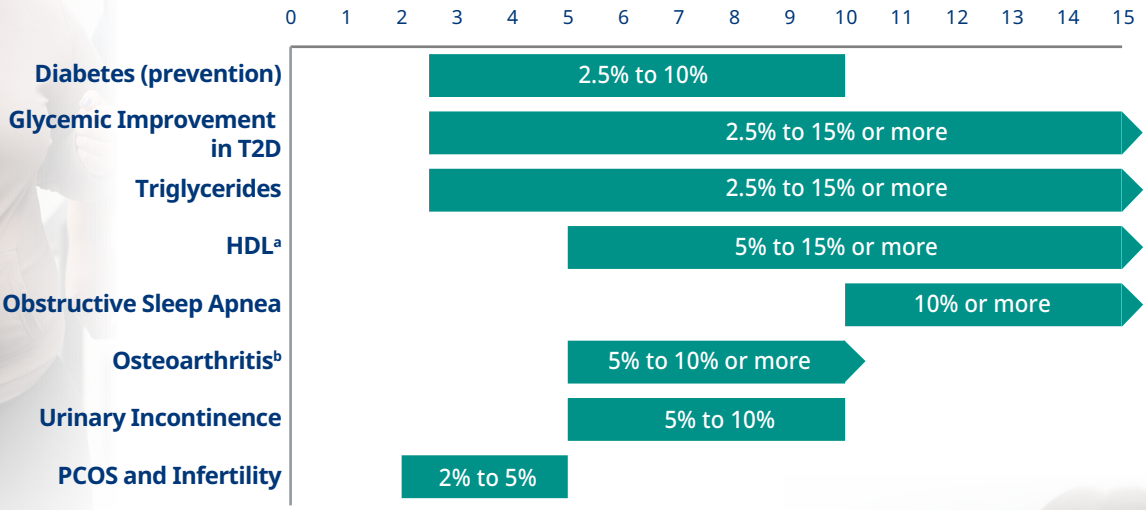
	Pharmacotherapy	Bariatric Surgery
Population	Adolescents 12 years and older with obesity (BMI ≥95th percentile)	Adolescents 13 years and older with severe obesity (BMI ≥120% of the 95th percentile for age and sex)
Recommendation	Pharmacotherapy, according to medication indications, risks, and benefits, as an adjunct to healthy behavior and lifestyle treatment	Evaluation for metabolic and bariatric surgery to local or regional comprehensive, multidisciplinary, pediatric, metabolic, and bariatric surgery centers

AAP=American Academy of Pediatrics.

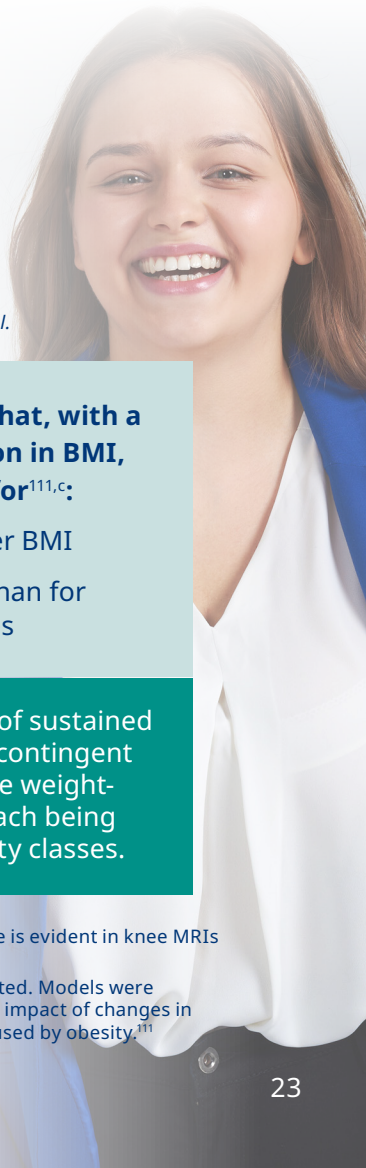
Actor portrayal.

Weight reduction of 2% to >15% can lead to **clinical improvements in many comorbidities** associated with obesity[50]

Clinical benefits provided by percent weight reduction



Studies indicate that a 5% to 10% weight reduction can help curb the economic impact of costly comorbidities[41]



Actor portrayal.

Estimated impact per each case avoided in the United States over 10 years[101,110]:

Coronary heart disease and stroke

- **3.3 million** cases avoided
- **~$2.97 PMPM** associated savings

Hypertension

- **3.6 million** cases avoided
- **~$0.41 PMPM** associated savings

Diabetes

- **4.1 million** cases avoided
- **~$2.08 PMPM** associated savings

Arthritis

- **1.9 million** cases avoided
- **~$0.55 PMPM** associated savings

Another study found that, with a given percent reduction in BMI, savings were greater for[111,c]:

- Individuals with higher BMI
- Those with diabetes than for those without diabetes

The economic benefits of sustained weight reduction are contingent upon the appropriate weight-management approach being available for all obesity classes.

[a]Not true for BMI >40 kg/m^2.[50]

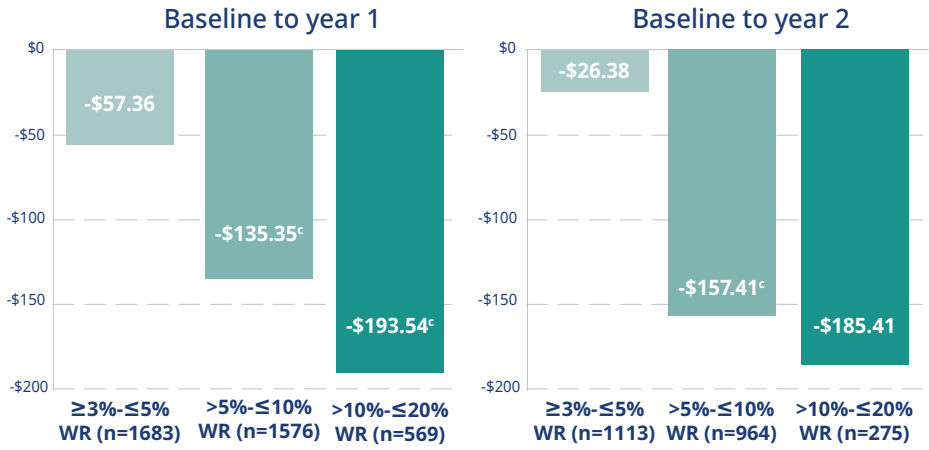
[b]While weight reduction of 5% or more may provide a clinical benefit to the signs and symptoms of osteoarthritis, no change is evident in knee MRIs or X-rays.[50]

[c]Using data from the Medical Expenditure Panel Survey for 2000-2010, 2-part models of instrumental variables were estimated. Models were estimated for all adults, as well as separately for those with and without diabetes. Study investigators calculated the causal impact of changes in BMI on medical care expenditures, cost savings for specific changes in BMI, and total excess medical care expenditures caused by obesity.[111]

HDL=high-density lipoprotein; PCOS=polycystic ovarian syndrome; PMPM=per-member-per-month.

Healthcare cost savings were greater for individuals with obesity who had a larger magnitude of weight reduction

In a retrospective cohort study, adjusted mean per-patient-per-month (PPPM) total healthcare savings were greater in all weight reduction groups compared with no weight change[112,a,b]



AOM usage was low (<0.5%) among the study population.[112]

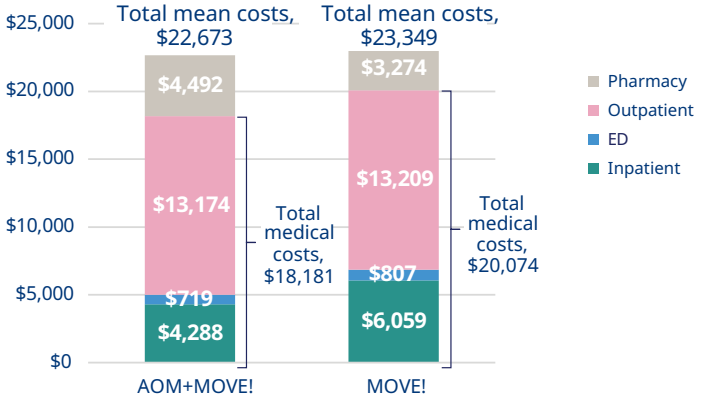
Actor portrayal.

Added pharmacy costs for patients on AOMs were offset by the reduced burden of illness, resulting in lower total medical costs[113]

Added pharmacy costs for patients on AOMs were offset by reduced burden of illness, resulting in lower total medical costs[113]

- The Motivating Overweight/Obese Veterans Everywhere! (MOVE!) program, introduced by the VA in 2006, uses lifestyle modifications to aid in obesity management
- Compared with those who only participated in lifestyle modifications (the MOVE! cohort), participants who also received AOMs (the AOM+MOVE! cohort)[d]:
  - Were more likely to have a weight decrease of >5% to 10% at 6 months, a trend that persisted at 12 and 24 months
  - Had improved measures of cardiometabolic parameters at 6 months[e]
  - Had lower rates of inpatient visits and emergency department visits

Total costs for AOM+MOVE! vs MOVE! cohorts, 2010-2020



The AOM+MOVE! cohort experienced $1893 less total medical costs compared with the MOVE! cohort.

[a]This retrospective, longitudinal cohort study utilized claims data from IBM MarketScan® and Explorys® EHR databases, focusing on patients covered by United States employer-sponsored private health insurance from January 1, 2012, to June 30, 2014. The objective of the study was to assess the short-term (1 year) and sustained (approximately 2 years) effects of nonsurgical weight loss on PPPM total all-cause healthcare costs among commercially insured adults (aged 18–64 years) with obesity (BMI ≥30 kg/m^2). Participants' BMI measurements at 12, 24, and 36 months were utilized to categorize them into no-weight-change cohorts, and weight-loss cohorts from the index date for data analysis. Additionally, it's important to note that the study specifically targeted adults with obesity receiving care at Tier 1 medical facilities offering comprehensive medical, surgical, psychological, nutritional, and other care. Therefore, the findings may not be generalizable to patients in ambulatory or primary care settings.[112]

[b]Healthcare costs were measured as PPPM all-cause costs and included inpatient visits, physician office visits, emergency room visits, and pharmacy costs.[112]

[c]$P<0.05$.[112]

[d]In a retrospective cohort study from January 2010 to April 2020, the AOM+MOVE! and MOVE! cohorts were matched in a 1:2 ratio. The AOMs used for the study were orlistat, liraglutide, phentermine/topiramate ER, and naltrexone ER/bupropion ER.[113]

[e]Measures included systolic and diastolic blood pressure, total cholesterol, LDL cholesterol, and HbA1c.[113]

ED=emergency department; ER=extended release; HbA1c=hemoglobin A1c; LDL=low density lipoprotein; VA=U.S. Department of Veterans Affairs; WR=weight reduction.

Impact of 10% weight reduction on drug costs[101]

Examples of annual costs for four branded weight-based dosed drugs before and after 10% weight reduction for select chronic conditions.[a]

Plaque Psoriasis	
Patient Characteristics	**Annual Drug Cost**
Body weight: 110 kg, Height: 170 cm	$116,395
Loss of 10% body weight: 99 kg	$58,197
Difference in annual drug cost after reduced body weight: **$58,197 (50% cost reduction)**	

Colorectal cancer	
Patient Characteristics	**Annual Drug Cost**
Body weight: 110 kg, Height: 170 cm	$38,574
Loss of 10% body weight: 99 kg	$28,909
Difference in annual drug cost after reduced body weight: **$9,665 (25% cost reduction)**	

Metastatic breast cancer	
Patient Characteristics	**Annual Drug Cost**
Body weight: 110 kg, Height: 170 cm	$93,657
Loss of 10% body weight: 99 kg	$67,901
Difference in annual drug cost after reduced body weight: **$25,756 (27% cost reduction)**	

Routine prophylaxis to prevent or reduce bleeding episode	
Patient Characteristics	**Annual Drug Cost**
Body weight: 110 kg, Height: 170 cm	$367,920
Loss of 10% body weight: 99 kg	$266,742
Difference in annual drug cost after reduced body weight: **$101,178 (27% cost reduction)**	

Actor portrayal.

[a]For estimation purposes only. A single product in each category was selected. The annual costs were calculated based on the September 2023 wholesale acquisition costs (WAC) of the selected medications from Redbook and the dosing information from the package inserts as of September 2023 of the selected medications. The inputs for the calculation included actual body weight and cost per mg or mL. The annual cost per patient was determined, and the difference in cost of 1 year of treatment is noted between Patient A and Patient B.

Summary

Obesity is...

- A chronic disease[1,2]
- Highly prevalent, and the prevalence has been increasing[32]
- Associated with more than 200 comorbidities[43]

Obesity is costly due to...

- Excess medical expenditures[92]
- Obesity-related complications[41,95]
- Indirect costs for employers, such as absenteeism, disability, and workers' compensation[97-99]

AOMs are...

- Part of a comprehensive treatment approach to weight reduction, in addition to ongoing lifestyle modfications[3]
- Supported by recognized third-party guidelines[41]
- More accessible today than in the past[107,108]

Obesity treatment can result in...

- Improve certain obesity-related comorbidities[41]
- Healthcare cost savings[112]

Actor portrayal.

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