Medicine 439

MED439
KING SAUD UNIVERSITY

Revised & Approved
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Epidemiology of obesity

Editing file

Lecture Objectives:

- To understand the magnitude of obesity worldwide and nationally
- To define obesity
- To list the risk factors for obesity
- To list complications of obesity
- To learn the different treatment modalities for obesity
- To apply prevention measures for obesity, starting with the level of your community

- **Important**
- **Original content**
- **Boys Slides**
- **Girls Slides**
- **Doctor's notes**
- **Extra**

Definition of obesity & classification

Defining obesity:

"a condition of abnormal and excessive fat accumulation in adipose tissue to the extent that health may be adversely affected".

"Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health, obesity by itself is a disease".

Adults

- BMI ≥ 30.0 is obese
- 25.0-29.9 is overweight
- 18.5-24.9 is normal
- < 18.5 is underweight

Children/Adolescent

- Sex/age-specific BMI
- BMI ≥ 95th percentile is obese.
- 85th to less than 95th percentile is overweight.

Subdivision of obesity

Grade 1 obesity	BMI 30.0-34.9
Grade 2 obesity	BMI 35.0-39.9
Grade 3 obesity	BMI 40.0+ (extreme obesity)

Classification of child obesity Boys slides

- In U.S : obesity weight greater than or equal to the 95th percentile.

International Obesity Taskforce

0-5

Overweight: 2 standard deviation (SD) Above median BMI

Obese: 3 SD above median BMI

5-19

Overweight: 1 SD above median BMI

Obese: 2 SD above median BMI

Classification of obesity (Adults)

International Classification of adult underweight, overweight and obesity according to BMI

Classification	BMI(kg/m^2)	
	Principal cut-off points	Additional cut-off points
Underweight	**<18.50**	**<18.50**
Severe thinness	<16.00	<16.00
Moderate thinness	16.00 – 16.99	16.00 – 16.99
Mild thinness	17.00 – 18.49	17.00 – 18.49
Normal range	**18.50 – 24.99**	**18.50 – 22.99**
		23.00 – 24.99
Overweight	**≥25.00**	**≥25.00**
Pre obese	25.00 – 29.99	25.00 – 27.49
		27.50 – 29.99
Obese	**≥30.00**	**≥30.00**
Obese class I	30.00 – 34.99	30.00 – 32.49
		32.50 – 34.99
Obese class II	35.00 – 39.99	35.00 – 37.49
		37.50 – 39.99
Obese class III	≥40.00	≥40.00

From World Health Organization. BMI Classification. 2016. Available at: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html. Accessed July 26, 2016; with permission.

Female doctor: you have to know this as a physician

Primary Screening Measure for obesity

Body Mass Index (BMI) = weight(kg) / height(m)2 Girls slides

1- Calculated from a person's weight and height.
2- Reliable indicator of body fatness for most people.
3- Inexpensive & easy-to-perform screening for weight categories that may lead to health problems.
4- Does not measure body fat directly.

Other Ways of estimating obesity:

1. Look
2. Scale
3. Waist circumference

Boys slides

BMI indicators provide a measure of body mass/weight rather than providing a direct measure of body fat. Whilst physicians continue to use BMI as a general indicator of weight-related health risks, there are some cases where its use should be considered more carefully:
and it's considered the best screening method to diagnose obesity.

- Muscle mass can increase body weight; this means athletes or individuals with a high muscle mass percentage can be deemed overweight on the BMI scale, even if they have a low or healthy body fat percentage.
- Muscle and bone density tends to decline as we get older; this means that an older individual may have a higher percentage body fat than A younger individual with the same BMI.
- Women tend to have a higher body fat percentage than men for a given BMI.
- We use BMI for adult ONLY We don't use it in children because age is something we put it in consideration when we are considering obesity among children.

Global Burden

- Overweight + obesity were estimated to cause 3.4 million deaths worldwide in 2010
- Accounted for 3.9% of years of life lost
- Accounted for 3.8% of DALYs Associated with reduction of life expectancy by 5-10 years

Obesity as disease

- "Recognize obesity as a disease state with multiple pathophysiological aspects requiring a range of interventions to advance obesity treatment and prevention." - American Medical Association

Incidence of obesity (new cases): Girls slides

- No official measures of Saudi obesity incidence currently
- Would require accurately identifying the population at risk (non-obese) at a given time, as well as new cases
- Potential for prospective cohort studies

Obesity is associated with increase in

1. All-cause mortality
2. Cancer related mortality
3. CVD-related mortality

Comparing Estimates across countries 2013

	Males <20		Males, >20		Females, <20		Females, >20	
Country/Region	Overweight	Obese	Overweight	Obese	Overweight	Obese	Overweight	Obese
Morocco	22·5 (19·3-26·1)	7·9 (6·4-9·6)	54·7 (51·7-57·5)	18·1 (16·3-20·0)	25·9 (22·1-30·2)	9·1 (7·3-11·3)	52·8 (50·0-55·5)	20·9 (18·8-23·1)
Oman	24·5 (20·5-28·5)	8·4 (6·7-10·2)	53·7 (50·9-56·7)	20·6 (18·5-22·7)	42·3 (37·4-47·5)	15·4 (12·4-18·5)	73·4 (71·0-75·7)	36·9 (33·9-40·1)
Palestine	27·9 (23·8-31·9)	11·9 (9·8-14·3)	70·0 (67·4-72·4)	29·8 (28·0-31·5)	30·6 (26·4-35·5)	12·5 (10·1-15·2)	77·0 (74·8-79·2)	42·4 (40·5-44·4)
Qatar	33·5 (29·3-38·0)	18·8 (15·8-21·9)	75·7 (73·8-77·4)	44·0 (41·8-46·4)	22·1 (18·6-25·7)	15·5 (12·6-18·6)	78·5 (77·0-80·1)	54·7 (52·1-57·0)
Saudi Arabia	23·5 (20·2-26·8)	9·4 (7·8-11·2)	69·0 (67·1-70·7)	30·0 (28·4-31·8)	37·4 (32·8-42·5)	14·8 (12·2-17·7)	74·2 (72·3-76·0)	44·4 (42·4-46·5)
Sudan	11·2 (9·2-13·4)	5·7 (4·6-6·9)	35·8 (33·2-38·4)	12·7 (11·3-14·2)	14·4 (12·0-17·6)	5·8 (4·5-7·1)	39·9 (37·3-42·7)	18·3 (16·4-20·4)
Syria	32·9 (28·6-37·5)	13·9 (11·5-16·5)	72·0 (69·5-74·2)	24·2 (21·8-26·6)	33·3 (28·8-38·3)	15·4 (12·5-18·6)	72·7 (69·9-75·1)	39·9 (36·8-43·0)
Tunisia	17·7 (15·0-20·8)	4·2 (3·4-5·2)	51·7 (48·8-54·4)	15·3 (13·7-16·9)	23·4 (19·6-27·5)	4·2 (3·3-5·2)	57·5 (54·4-60·3)	12·8 (11·3-14·3)
Turkey	20·4 (17·5-23·6)	7·1 (5·7-8·7)	63·8 (62·1-65·5)	20·1 (18·7-21·3)	19·8 (16·6-23·0)	5·7 (4·5-7·0)	65·8 (64·2-67·5)	34·1 (32·4-35·8)
United Arab Emirates	30·8 (26·5-35·1)	12·2 (9·8-14·7)	66·1 (63·6-68·8)	27·1 (24·5-30·0)	31·6 (27·1-36·2)	12·6 (10·0-15·7)	60·6 (57·4-63·4)	33·2 (30·2-36·3)
Yemen	8·4 (6·9-10·0)	1·7 (1·4-2·1)	29·0 (26·8-31·2)	4·1 (3·7-4·7)	26·9 (22·9-31·4)	8·3 (6·5-10·3)	57·9 (55·1-60·8)	24·7 (22·2-27·2)
Spain	27·6 (23·9-31·2)	8·4 (6·7-10·2)	62·3 (60·0-64·9)	20·2 (18·5-22·1)	23·8 (20·2-27·4)	7·6 (6·0-9·3)	46·5 (43·7-48·9)	20·9 (19·0-23·1)
Sweden	20·4 (17·5-23·4)	4·3 (3·6-5·3)	58·2 (55·6-61·0)	18·9 (17·0-21·0)	19·3 (16·5-22·5)	4·0 (3·2-5·0)	45·8 (43·2-48·5)	19·8 (17·7-21·9)
Switzerland	20·7 (17·4-24·4)	6·6 (5·4-7·9)	56·6 (53·7-59·4)	18·4 (16·5-20·1)	16·2 (13·4-19·4)	5·5 (4·3-6·8)	39·9 (37·0-42·9)	17·0 (15·3-18·8)
United Kingdom	26·1 (23·8-28·5)	7·4 (6·5-8·5)	66·6 (65·3-68·0)	24·5 (23·4-25·7)	29·2 (26·8-31·9)	8·1 (7·0-9·3)	57·2 (55·7-58·6)	25·4 (24·2-26·6)
Denmark	19·7 (16·8-23·1)	8·7 (7·1-10·7)	59·2 (56·5-61·9)	19·6 (17·7-21·9)	19·4 (15·8-23·2)	5·9 (4·7-7·5)	44·7 (41·7-47·7)	19·9 (17·7-22·0)
Finland	26·0 (22·3-29·8)	9·2 (7·5-11·2)	62·2 (59·5-64·9)	20·9 (18·9-23·2)	21·1 (17·7-25·0)	6·6 (5·2-8·1)	50·4 (47·5-53·2)	22·3 (20·3-24·6)
France	19·9 (16·8-23·3)	5·8 (4·7-7·0)	55·9 (53·2-58·7)	19·3 (17·4-21·4)	16·0 (13·3-18·7)	4·7 (3·8-5·9)	42·8 (40·0-45·7)	19·7 (17·7-21·7)
Germany	20·5 (17·4-23·8)	5·5 (4·5-6·7)	64·3 (61·9-66·8)	21·9 (20·2-23·8)	19·4 (16·3-22·5)	5·3 (4·2-6·5)	49·0 (46·5-51·4)	22·5 (20·5-24·7)

	Males <20		Males, >20		Females, <20		Females, >20	
Country/Region	Overweight	Obese	Overweight	Obese	Overweight	Obese	Overweight	Obese
Algeria	21·7 (18·5-25·2)	7·7 (6·2-9·4)	42·0 (39·0-44·8)	11·1 (9·8-12·3)	30·0 (25·5-34·5)	15·3 (12·5-18·6)	57·8 (55·1-60·9)	24·9 (22·6-27·4)
Bahrain	22·4 (19·2-26·0)	9·3 (7·3-11·4)	67·7 (65·3-70·2)	31·0 (28·4-33·7)	26·7 (22·5-30·8)	10·7 (8·5-13·4)	75·2 (72·8-77·5)	42·9 (40·0-45·9)
Egypt	31·5 (27·5-35·7)	12·7 (10·7-15·2)	71·2 (68·9-73·7)	26·4 (25·0-27·8)	39·5 (34·7-44·3)	14·4 (11·9-17·6)	79·4 (77·6-81·3)	48·4 (46·1-50·9)
Iran	21·6 (18·6-25·4)	5·9 (4·8-7·2)	49·4 (47·2-51·6)	13·6 (12·5-14·8)	26·2 (22·3-30·4)	7·2 (5·7-8·9)	63·3 (61·0-65·4)	29·3 (27·2-31·6)
Iraq	19·5 (16·5-22·8)	8·2 (6·8-9·8)	62·4 (59·7-65·3)	25·7 (23·3-28·1)	25·0 (21·3-28·9)	8·2 (6·6-10·0)	68·1 (65·1-70·9)	37·5 (34·4-40·6)
Jordan	24·1 (20·6-28·0)	8·0 (6·4-9·9)	71·6 (69·3-74·1)	27·5 (25·3-29·7)	25·4 (21·8-29·3)	8·0 (6·2-10·0)	75·6 (74·0-77·3)	45·6 (43·4-47·9)
Kuwait	24·6 (21·1-28·5)	16·7 (13·9-20·1)	74·5 (72·4-76·6)	43·4 (40·9-46·1)	45·5 (40·1-50·9)	23·3 (19·5-27·8)	84·3 (82·6-86·1)	58·6 (55·7-61·4)
Lebanon	33·1 (28·9-37·9)	15·9 (13·0-19·1)	71·1 (68·9-73·4)	26·3 (24·2-28·4)	29·8 (25·6-34·0)	12·5 (10·2-15·4)	62·3 (59·9-64·8)	29·3 (27·0-31·7)
Libya	32·5 (28·5-36·9)	14·5 (12·0-17·0)	70·6 (68·1-73·1)	30·2 (27·6-32·9)	41·7 (36·3-46·8)	22·1 (18·1-26·4)	77·0 (74·6-79·3)	57·2 (54·0-60·4)
Morocco	22·5 (19·3-26·1)	7·9 (6·4-9·6)	54·7 (51·7-57·5)	18·1 (16·3-20·0)	25·9 (22·1-30·2)	9·1 (7·3-11·3)	52·8 (50·0-55·5)	20·9 (18·8-23·1)
Oman	24·5 (20·5-28·5)	8·4 (6·7-10·2)	53·7 (50·9-56·7)	20·6 (18·5-22·7)	42·3 (37·4-47·5)	15·4 (12·4-18·5)	73·4 (71·0-75·7)	36·9 (33·9-40·1)
Palestine	27·9 (23·8-31·9)	11·9 (9·8-14·3)	70·0 (67·4-72·4)	29·8 (28·0-31·5)	30·6 (26·4-35·5)	12·5 (10·1-15·2)	77·0 (74·8-79·2)	42·4 (40·5-44·4)
Qatar	33·5 (29·3-38·0)	18·8 (15·8-21·9)	75·7 (73·8-77·4)	44·0 (41·8-46·4)	22·1 (18·6-25·7)	15·5 (12·6-18·6)	78·5 (77·0-80·1)	54·7 (52·1-57·0)
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Syria	32·9 (28·6-37·5)	13·9 (11·5-16·5)	72·0 (69·5-74·2)	24·2 (21·8-26·6)	33·3 (28·8-38·3)	15·4 (12·5-18·6)	72·7 (69·9-75·1)	39·9 (36·8-43·0)
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United Arab Emirates	30·8 (26·5-35·1)	12·2 (9·8-14·7)	66·1 (63·6-68·8)	27·1 (24·5-30·0)	31·6 (27·1-36·2)	12·6 (10·0-15·7)	60·6 (57·4-63·4)	33·2 (30·2-36·3)
Yemen	8·4 (6·9-10·0)	1·7 (1·4-2·1)	29·0 (26·8-31·2)	4·1 (3·7-4·7)	26·9 (22·9-31·4)	8·3 (6·5-10·3)	57·9 (55·1-60·8)	24·7 (22·2-27·2)
Philippines	5·5 (4·5-6·6)	2·6 (2·1-3·2)	22·9 (21·0-24·8)	4·1 (3·6-4·7)	5·4 (4·4-6·6)	2·1 (1·6-2·7)	25·9 (23·8-28·2)	6·2 (5·5-7·0)

Attributes associated with obesity

- 1- Race/ethnicity
- 2- Age
- 3- Sex
- 4- Income
- 5- Education
- 6- Geography & culture

1- Race/ethnicity

Adults	Children/Adolescents
47% Hispanic 46.8% non-Hispanic black 37.9% non-Hispanic white 12.7% non-Hispanic Asian	25.8% Hispanic 22% non-Hispanic black 14.1% non-Hispanic white 11% non-Hispanic Asian

- The assumption that race reflects only biological distinctions is inaccurate.
- Suggestion from WHO Western Pacific Region that BMI cutoffs may need to be lower for some Asian populations due to increased risk for poor health outcomes

2- Age

Adults (20+)	Children/Adolescents (it's much less)
42.8% ages 40-59 41% ages 60+ 39.6% ages 20-39	20.6% ages 12-19 (Age is play a role in obesity) 18.4% ages 6-11 13.9% ages 2-5*

3- Income (When income decrease obesity increase)

- Higher incomes associated with decreased risk of obesity in women, but increased risk in non-Hispanic black men and Mexican-American men
- Being at or below the poverty line is associated with higher rates of obesity among children
- 9 of 10 states with the highest obesity rates are among the poorest
- Many low -and middle- income countries are now facing a "double burden" of malnutrition.
- While these countries continue to deal with the problems of infectious diseases and undernutrition, they are also experiencing a rapid upsurge in noncommunicable disease risk factors such as obesity and overweight, particularly in urban settings.
- It is not uncommon to find undernutrition and obesity co-existing within the same country, the same community and the same household.

Attributes associated with obesity

4- Education (low education—> high risk of obesity)

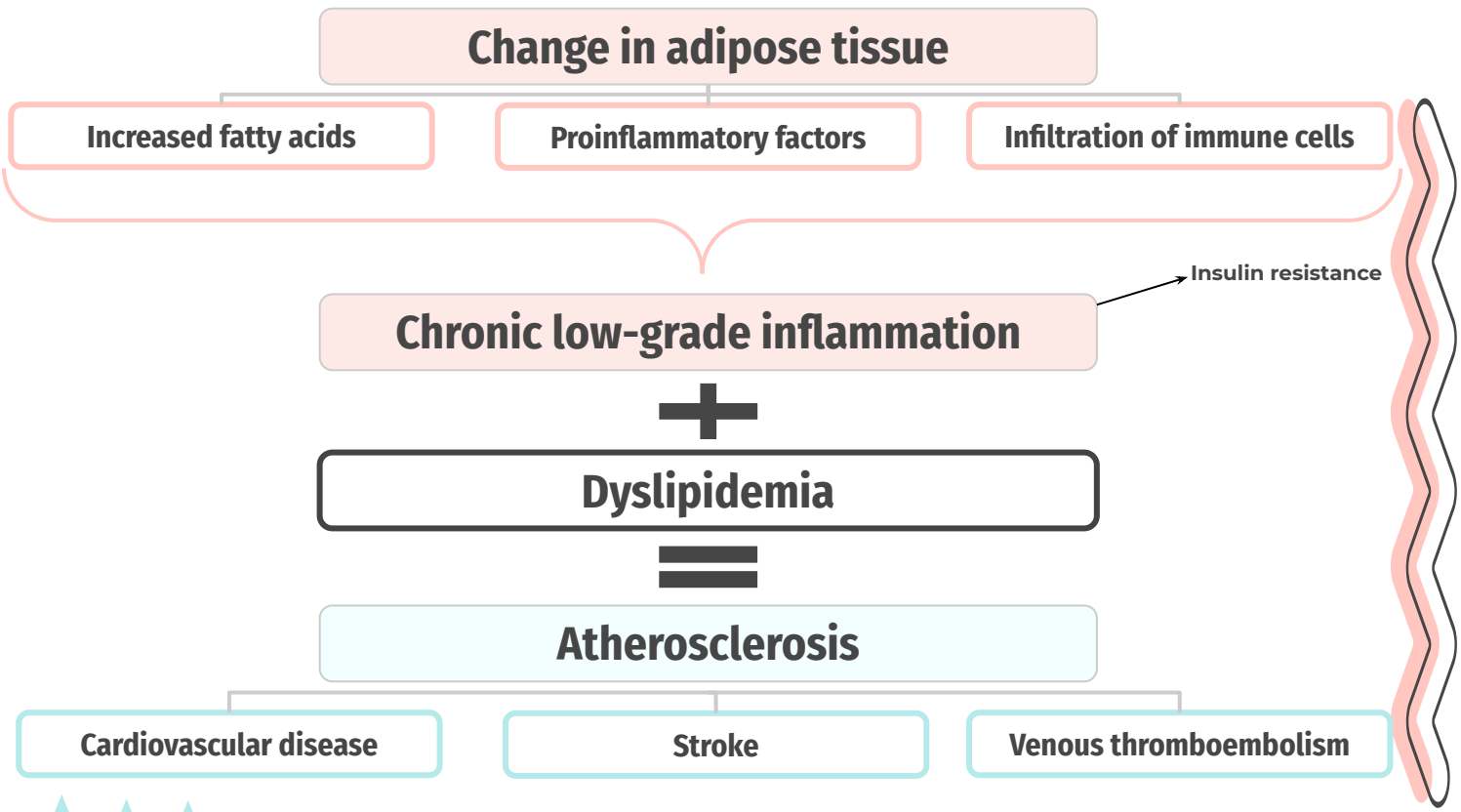
- Women with college degrees have lower risk of obesity compared to those with less education.
- Generally, obesity rates are lower for children if the head of household has college degree versus not finishing high school.

5- Geography & culture

- Higher prevalence of obesity in rural areas because rural areas can be considered as a lower income areas.
- States with highest rates of obesity also have lowest physical activity rates for adults.
- Unhealthy food and physical activity environments
- Limited food access, availability, affordability.

Pathophysiology of Obesity

Female Dr: You don't have to go with this in details because you will take it in other subject



Risk factors for obesity

Genetic | Hormonal | Environmental | Behavioral

Genetic risk factors for obesity

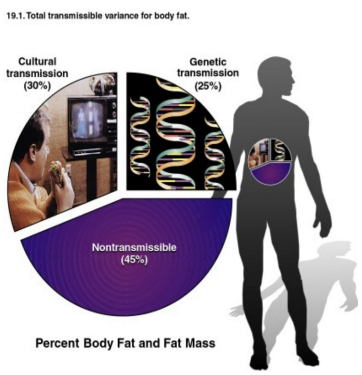
1- Parents who are obese (family history)

2- Genetic disorders: Trisomy 21 (Down's Syndrome), Prader-Willi Syndrome, Albright's hereditary osteodystrophy, Leptin deficiency, Leptin receptor mutations, Melanocortin 4 receptor disorders, Cushing's disease, and Polycystic ovary syndrome

3- Potential gene variants affecting hunger or metabolism, interacting with environmental influences, some people have problems with hunger metabolism so when they full or hunger and they don't have that sense of fullness or hunger it's a gene variation that actually causes that so it goes under the genetic.

Genetic plays a role

How much variation in weight gain among individuals can be accounted for by genetic factors? 25%	Largest transmissible variation is cultural



Hypothyroidism | GH deficiency | Cushing syndrome

Hormonal Risk Factors for Obesity

Hypothalamic obesity | Polycystic ovary syndrome (PCO) | Hyperprolactinemia

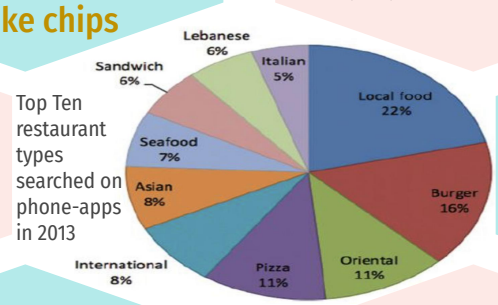
Environmental/Societal Risk Factors for Obesity

it's the most important risk factor

Low income because they consume low quality and high carb food like chips

Parents' bad habits for food and physical activity

Food desert (Difficulty accessing places with healthy food options)



Living far away from parks which makes people more less active

Dangerous neighborhoods so they don't go outdoor

Food insecurity (no sufficient quantity of affordable healthy food) because usually healthy food are more expensive.

Behavioral Risk Factors for Obesity

Nutrition and diet

Sleep

Physical activity

Stress

Adverse behavior Girls slides					
Diets high in calories, added sugars, fast food	Low physical activity		Television or other media		
Average daily calorie intake for adults: 2,234	Only 19% of Americans meet minimum guidelines	Saudi Arabia is one of the countries with low physical activity	Sedentary activity	Increased exposure to food/beverage marketing	Over 7.5 hours daily for older children/adolescent

Other risk factors Girls slides

1. Extreme birth weight (low or high).
2. Maternal smoking.
3. Not being breastfed.
4. Disabilities.
5. Medication (steroids, antidepressants).

Morbidity/Mortality Effects on population health Girls slides

"I would argue that [obesity] is the most significant public health challenge we face at this time, both because of the huge number of people it affects and because of the ripple effects it has and will have on the development of debilitating and costly chronic diseases." - Daniel R. Glickman, Chair, Institute of Medicine's Committee on Accelerating Progress in Obesity Prevention, 2012.

Morbidity associated with obesity

The bad type of fat that accumulate in individual body is the one that accumulated in the abdomen.or visceral fat.

- Type 2 Diabetes Mellitus.
- Nonalcoholic fatty liver disease.
- Cardiovascular Disease.
- Stroke.
- Hypertension.
- Osteoarthritis.
- Some cancer.

TABLE 2-1 Physical Health, Psychosocial, and Functional Consequences of Obesity Over the Life Course

Physical Health	Psychosocial	Functional
• Cardiovascular disease • Cancer • Glucose intolerance and insulin resistance • Type 2 diabetes • Hypertension • Dyslipidemia • Hepatic steatosis • Cholesitasis • Sleep apnea • Reduction of cerebral blood flow • Menstrual abnormalities • Orthopedic problems • Gallbladder disease • Hyperuricemia and gout	• Stigma • Negative stereotyping • Discrimination • Teasing and bullying • Social marginalization • Low self-esteem • Negative body image • Depression	• Unemployment • Mobility limitations • Disability • Low physical fitness • Absenteeism from school or work • Disqualification from active service in the military and fire/police services • Reduced productivity • Reduced academic performance

SOURCE: Adapted from IOM, 2010a.

Female Dr: Just read them

Mortality Girls slides

More deaths globally associated with obesity/overweight than underweight (2.8 million/year).

Morbidity from childhood obesity Girls slides

- Preschoolers who are overweight or obese are 5 times as likely to be overweight or obese as adults.
- Obesity is a **long term** process.
- Obesity frequently begins in childhood.
- **Obese parents** likely have overweight children.
- Regardless of final body weight as adults, overweight children exhibit more illnesses as adults than normal kids **because they were obese or overweight when they were children!**

Screening Limitations and Recommendations Girls slides

"Body Mass Index"

- BMI was first used in 1835 as a way to estimate the proportion of body fat based on height and weight.
- BMI has low sensitivity, especially below 30.
- Cannot discern fat vs. muscle content or metabolic risk factors Validity?
- At the same BMI, women tend to have more body fat than men.
- At the same BMI, older people, on average, tend to have more body fat than younger adults.
- Highly trained athletes may have a high BMI because of increased muscularity rather than increased body fatness.
- BMI provides the most useful population-level measure of overweight and obesity as it is the same
- For children, age needs to be considered when defining overweight and obesity

"BMI + waist circumference"

TABLE 1. National Heart Lung and Blood Institute Classifications of Overweight and Obesity by BMI and Waist Circumference in Adults[4]

Classification	BMI (kg/m^2)	Risk of type 2 diabetes, hypertension, and CVD *relative* to normal weight and waist circumference*	
		Men ≤ 40 in Women ≤ 35 in	Men >40 in Women > 35 in
Underweight	< 18.5	---	---
Normal weight	18.5 – 24.9	---	---
Overweight	25.0 – 29.9	Increased	High
Obesity (Class I)	30.0 – 34.9	High	Very High
Obesity (Class II)	35.0 – 39.9	Very High	Very High
Extreme obesity (Class III)	≥ 40	Extremely High	Extremely High

*NHLBI guidelines note that increased waist circumference can indicate increased disease risk even in individuals considered normal weight.

"Additional limitations"

Self-report of height & weight in surveys

Costs Financial impacts on the healthcare system Girls slides

- Medical care costs increasing over time mostly due to rise in obesity prevalence.
- Socioeconomic costs also related to disability and premature death.
- $147 billion in health care costs in 2008 (10% of all medical spending).
- Increases in spending from 1998-2006
  8.5% ($34.3 billion) Medicare.
  11.8% ($27.6 billion) Medicaid.
  12.9% ($74.6 billion) Commercial insurance.

Interventions
Primary, secondary, tertiary, community-level

Primary prevention
Preventing obesity before it occurs Girls slides

- Regulating caloric energy balance to prevent problematic weight gain by Diet and Physical activity.
- Environmental factors.

Address barriers to a healthy diet	Address barriers to physical diet
• Access to healthy food. • Food advertising. • Large portion sizes. • Affordability of healthy food. • Time constraints. • Established behaviors.	• Zoning. • Safety. • Area conductive to physical activity.. • Time constraints. • Established behaviors.
Physical activity guidelines	**Policy options**
• 2.5 hours/week for adults. • 1 hour/day for children/adolescents. • Physical activity tends to decline as children get older.	• Tax unhealthy foods/beverages. • Calorie labeling in food service facilities. • Food purchasing standards for hospitals/schools.

Secondary prevention Girls slides

- Recognize overweight or obese individuals early through screening in order toimprove outcomes
- Weight loss interventions.
- Challenges with sustaining weight loss over time.
- Reduce risk factors associated with obesity
- Secondary screening for potential comorbidities.
- Need to understand different causes and responses to obesity in order to better target treatments.

Tertiary prevention

- Management of severe obesity to reduce complications.
- Behavioral modifications.
- Bariatric surgery.
  - Type 2 diabetes, other comorbidities.
- Medications, if shown to be effective.

Community-level prevention Girls slides

- Incentives for markets to locate to areas with limited food access.
- Food and physical activity standards for childcare, schools, and hospitals.
- Identifying viable/safe resources for promoting physical activity.
- Partnerships for change, including healthy choices and behaviors.
- Breastfeeding.

Community-level interventions:

1. Obesity Prevention Foundation.
2. Educational interventions in schools.
3. Focus on healthy diet/physical activity choices.

Consequences of Obesity in Adults

Table 1 Morbidities associated with obesity (Hamdy, 2016; Petry, Barry, Pietrzak, & Wagner, 2008; Pi-Sunyer, 2009; Sakai et al., 2005; Smith, Hulsey, & Goodnight, 2008; Yosipovitch, DeVore, & Dawn, 2007)

Class of event	Comorbidities associated with obesity
Cancer/malignancy	Postmenopausal breast, endometrial, colon and rectal, gallbladder, prostate, ovarian, endometrial renal cell, esophageal adenocarcinoma, pancreatic, and kidney cancer
Cardiovascular	Coronary artery disease, obesity-associated cardiomyopathy, essential hypertension, left ventricular hypertrophy, cor pulmonale, accelerated atherosclerosis, pulmonary hypertension of obesity, dyslipidemia, chronic heart failure (CHD), left ventricular hypertrophy (LVH), cardiomyopathy, pulmonary hypertension, lymphedema (legs)
Gastrointestinal (GI)	Gall bladder disease (cholecystitis, cholelithiasis), gastroesophageal reflux disease (GERD), reflux esophagitis, nonalcoholic steatohepatitis (NASH), nonalcoholic fatty liver disease (NAFLD), fatty liver infiltration, acute pancreatitis
Genitourinary	Stress incontinence
Metabolic/endocrine	Type 2 diabetes mellitus, prediabetes, metabolic syndrome, insulin resistance, and dyslipidemia
Musculoskeletal/orthopedic	Pain in back, hips, ankles, feet and knees; osteoarthritis (especially in the knees and hips), plantar fasciitis, back pain, coxavera, slipped capital femoral epiphyses, Blount disease and Legg-Calvé-Perthes disease, and chronic lumbago
Neurological and central nervous system (CNS)	Stroke, dementia idiopathic intracranial hypertension, and meralgia paresthesia
Obstetric and perinatal	Pregnancy-related hypertension, fetal macrosomia, very low birthweight, neural tube defects, preterm birth, increased cesarean delivery, increased postpartum infection and pelvic dystocia, preeclampsia, hyperglycemia, gestational diabetes (GDM)
Skin	Keratosis pilaris, hirsutism, acanthosis nigricans, and acrochondons, psoriasis, intertrigo (bacterial and/or fungal), and increased risk for cellulitis, venous stasis ulcers, necrotizing fasciitis, and carbuncles
Psychological	Depression, anxiety, personality disorder, and obesity stigmatization
Respiratory/pulmonary	Obstructive sleep apnea (OSA), Pickwickian syndrome (obesity hypoventilation syndrome), higher rates of respiratory infections, asthma, hypoventilation, pulmonary emboli risk
Surgical	Increased surgical risk and postoperative complications, deep venous thrombosis, including wound infection, pulmonary embolism, and postoperative pneumonia
Reproductive (Women)	Anovulation, early puberty, polycystic ovaries, infertility, hyperandrogenism, and sexual dysfunction
Reproductive (Men)	Hypogonadotropic hypogonadism, polycystic ovary syndrome (PCOS), decreased libido, and sexual dysfunction
Extremities	Venous varicosities, lower extremity venous and/or lymphatic edema

Consequences of Obesity in Children

1. T2 Diabetes Mellitus.
2. Early onset metabolic syndrome.
3. Asthma.
4. Poor dental health.
5. Non-alcoholic fatty liver disease.
6. Gastroesophageal Reflux Disease.
7. Puberty (delay in boys, advance in girls).
8. Hyperandrogenism, PCOS.
9. Poor self-esteem.
10. Attention Deficit Hyperactivity Disorder (ADHD).
11. Sleep problems.

Important Strategies For Maintaining Weight Reduction Boys slides

1 Changing lifestyle

- Modify food intake.
- Increase physical activity.
- Exercise 1 hour daily.
- Weigh weekly.
- Watch< 10 hours TV/week.

2 Set realistic goals

- 5-15% of initial weight.

3 Maintaining a food diary

4 Continuous support

5 Prepare the suitable environment

- Prepare the suitable environment.
- Organized family meal times.
- Meal prepping (plan what you eat ahead of time).

Treatment of Obesity

Tertiary prevention

- Bariatric surgery should be limited for BMI>40
- Behavioral modification.
- Treatment of underlying cause (if hormonal causes)

Prevention of obesity Boys slides

In children **VS** In adults

Next slides

Preventing Obesity in Children

Early stage prevention:

- maternal gestational weight control.

During infancy:

- Dietary intake (self-regulation of breastfeeding ↓ risk, early introduction of solid food ↑ risk).
- Broad spectrum antibiotics (↑ risk).

During pre-school :

- Response to child temperament.
- Dietary habits.
- Reducing screen time.

During infancy:

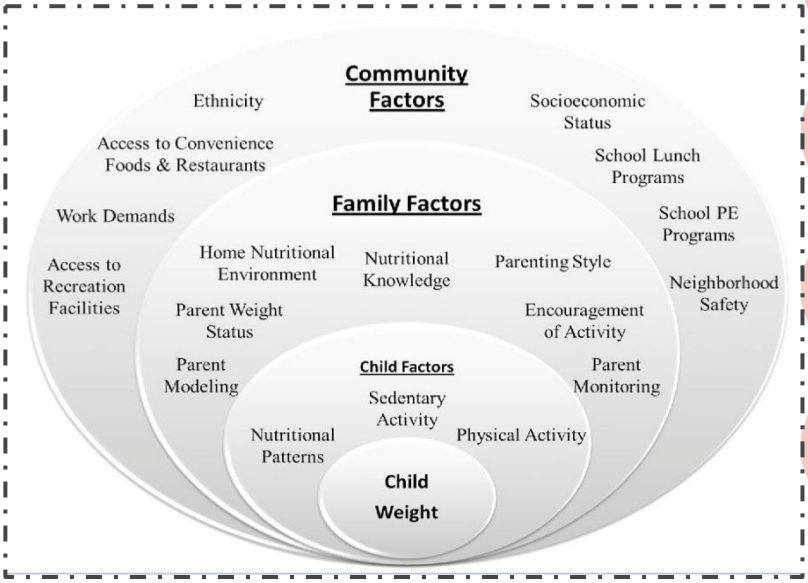
- Physical activity.
- Peer habits.
- Educational interventions in schools.

Secondary Prevention Measures Obesity in Children Boys slides

Screening for obesity by primary care provider -> provide counseling.

Provide guidance on nutrition and physical activity.

Tackling factors affecting childhood obesity



Prevention of Childhood Obesity at Community Level Boys slides

1. Provide services for obesity prevention and treatment (BMI screening, well-visits).
2. Promote healthy food and beverages and physical activity at schools.
3. Maintain safe neighborhoods.
4. Encourage going to parks and physical activity (especially summer vacation).
5. Availability of healthy food resources in all communities.
6. Funding research for childhood obesity.

Preventing obesity in adults

1. Educate and promote healthy lifestyle.
2. Promote social and environmental situation that prevents weight gain.
3. Involve different stakeholders in combating this epidemic.
4. Develop population-based policies that target:
   - barriers for healthy food and physical activity.
   - Influence positive eating and physical activity behavior.
   - Provide weight screening services, weigh control services.

Summary

Girls slides

- Obesity is affected by a complex interaction between the environment, genetic predisposition & human behavior.
- It has increased risk of numerous chronic diseases, from diabetes and cancers to many digestive diseases.
- The problem of overweight and obesity is one of the most pressing global issue with massive health care cost.
- Demands attention from the healthcare community, researchers, and policy makers.

Quiz

Q1- Which one of the following is a complication of obesity?			
A. Type I diabetes	B. Alcoholic fatty liver disease	C. ADHD	D. Cirrhosis
Q2- Which of the following hormonal imbalances is a risk factor for developing obesity?			
A. Hyperthyroidism	B. Hypoprolactinemia	C. GH Deficiency	D. Addison's disease
Q3- Which BMI is considered grade 1 obesity?			
A. 30-34.9	B. 35-39.9	C. 40-44.9	D. 45 and above
Q4- What class of medications can cause weight gain?			
A. Antidepressants	B. Beta blockers	C. Thyroxine	D. benzodiazepines
Q5- Bariatric surgery should be considered if BMI is			
A. >40	B. <40	C. <30	D. <35

Answers

1.C 2.C 3.A 4.A 5.A

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