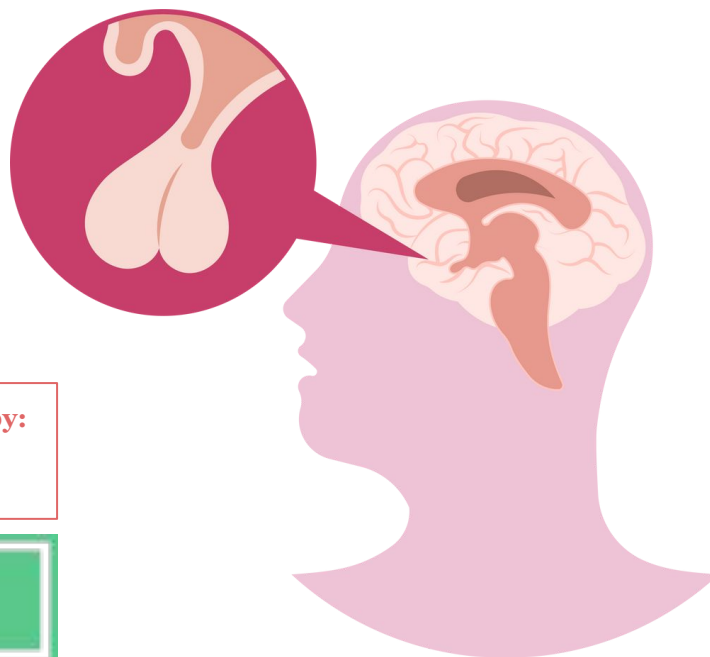




# Epidemiology of obesity



**This lecture was explained by:**  
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Dr. Armen Torchyan.

**Editing file**

**Color index :**

**Main text (Black)**

**Female slides (Pink)**

**Male slides (Blue)**

**Important things (Red)**

**Dr's notes (Green)**

**Extra information (Grey)**

# OBJECTIVES



Define Obesity.



Describe the magnitude of obesity as a health problem **worldwide & nationally**.



Discuss attributes associated with obesity.



Recognize the consequences and **complication** of obesity.



List the factors leading to obesity.



Learn the different treatment modalities for **obesity** and discuss the prevention of it.



# Definition and measurement of obesity

## Definition

- 1-A condition of abnormal and excessive fat accumulation in adipose tissue to the extent that health may be adversely affected. (Obesity is a disease)
- 2-Overweight & obesity are defined as abnormal or excessive fat accumulation that may impair health. (definition of World Health Organization)
- 3-Occurs when an individual's weight is higher than what is considered healthy for his or her height. (definition of CDC)

## Primary screening measure (measuring obesity)

### Female's Slides

### Body Mass Index (BMI) = Weight(kg) / Height(m<sup>2</sup>)

- BMI was first used in 1835 as a way to estimate the proportion of body fat based on height and weight, has low sensitivity especially below 30.
- Can't discern fat VS muscle content or metabolic risk factors.
- **Calculated from a person's weight and height.**
- Reliable indicator of body fatness for most people.
- **Inexpensive and easy-to-perform screening for weight categories that may lead to health problems.**
- Does not measure body fat directly.
- BMI provides the most useful population-level measure of overweight and obesity as it is the same for both sexes and for all ages of adults. However, it should be considered a rough guide because it may not correspond to the same degree of fatness in different individuals.
- **For children, age needs to be considered when defining overweight & obesity.**

#### BMI

It is not usually used in children because there is a difference in age, as each age group has a specific measurement, and whenever the age changes, we change the calculation and the normal range reference.

#### Screening:

Limitations and Recommendations

## Is BMI an appropriate measure of weight-related health?

### Male's 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:

- **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 of 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.

Additional limitations  
Self-report of height and weight in surveys  
(Reporting bias, weren't sure that the information are correct or not)

TABLE 1. National Heart Lung and Blood Institute Classification of Overweight and Obesity by BMI and Waist Circumference in Adults<sup>a</sup>

Classification	BMI (kg/m <sup>2</sup> )	Risk of type 2 diabetes, hypertension, and CVD relative to normal weight and waist circumference <sup>b</sup>	
		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	Extremely High
Extreme obesity (Class III)	≥ 40	Extremely High	Extremely High

<sup>a</sup>NHLBI guidelines state that increased waist circumference can indicate increased disease risk even in individuals considered normal weight.

## Other Ways of estimating obesity

### Female's slides

Look (the appearance).

Waist circumference  
(calculated by dividing WC by height).

Scale.



# Classification of obesity

## Children / Adolescent

- Sex/age-specific BMI.
- BMI  $\geq$  95th percentile is **obese**.
- In U.S obesity weight greater than or equal to the 95th percentile ,based on the 2000 CDC growth charts.
- 85th to less than 95th percentile is **overweight**.

## Adults

- BMI  $\geq$  30.0 is Obese
- 25.0-29.9 is Overweight
- 18.5-24.9 is Normal
- Less than 18.5 is Underweight

## Classification of obesity for adults

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

Classification	BMI (kg/m <sup>2</sup> )	
	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	$\geq$ 25.00	$\geq$ 25.00
Pre obese	25.00 – 29.99	25.00 – 27.49 27.50 – 29.99
Obese	$\geq$ 30.00	$\geq$ 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	$\geq$ 40.00	$\geq$ 40.00

## Subdivision of obesity

### Female's Slides

Grade 1 Obesity  
BMI 30.0-34.9

Grade 2 Obesity  
BMI 35.0-39.9

Grade 3 Obesity  
BMI  $\geq$ 40.0 (extreme obesity)

## Classification of child obesity (International Obesity Taskforce)

### Male's Slides

### (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.

## Global burden

### Male's Slides

Obesity were estimated to cause 5 million deaths worldwide in 2019

- Accounted for 3.9% of years of life lost
- Accounted for 3.8% of DALYs (Disability-adjusted life year)
- Associated with reduction of life expectancy by 5-10 year

### Obesity is associated with increase in:

- All-cause mortality
- Cancer related mortality
- CVD-related mortality



# Obesity as a disease

## Is obesity a disease or a condition/risk factor?

Recognize obesity as a disease state with multiple pathophysiological aspects requiring a range of interventions to advance obesity treatment & prevention.

by American Medical Association (AMA)

### Prevalence of obesity

Obesity worldwide prevalence:

- 1995 = 200 million
- 2000 = 300 million
- 2008 = 857 million
- 2013 = 2.1 billion
- 2016 = 2 billion
- 2021 WHO 2.7 billion adults will be overweight, over 1 billion affected by obesity
- **13% of the world's adult population (11% of men & 15% of women) were obese in 2016**

### Female's Slides

### Incidence of obesity

#### Female's Slides

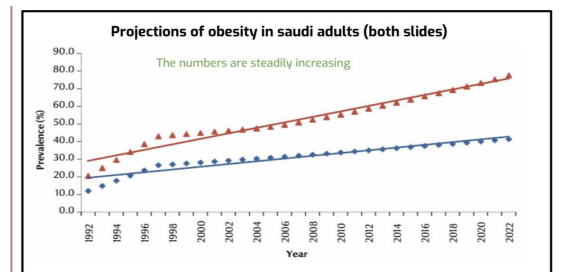
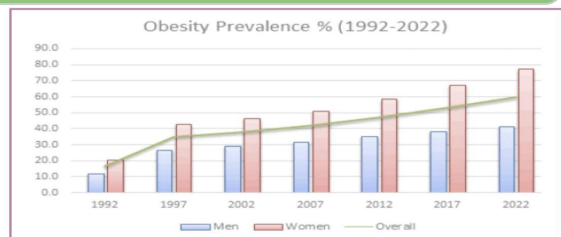
- No official measures of Saudi obesity incidence currently
- Would require accurately identifying the population at risk (non-obese) at a given time, as well as new cases
- Potential for prospective cohort studies

(The numbers in them aren't important, just for understand)  
Middle East is more prevalent to raise awareness about obesity

## Prevalence of obesity in Saudi Arabia

Country	Obesity Rate	BMI	Population 2019
American Samoa	74.60%	34.9	55,312
Tokelau	74.40%		1,340
Nauru	61.00%	32.5	10,756
Cook Islands	55.90%	33	17,548
Palau	55.30%	29.4	18,008
Marshall Islands	52.90%	29.2	58,791
Tuvalu	51.60%	29.3	11,646
Niue	50.00%		1,616
Tonga	48.20%	31.9	104,494
Samoa	47.30%	31.7	197,097
Kiribati	46.00%		117,606
Micronesia	45.80%	29.4	113,815
Aruba	38.20%		106,314
Kuwait	37.90%	30	4,207,083
Cayman Islands	36.60%		64,948
United States	36.20%	28.8	329,064,917
British Virgin Islands	35.50%		30,030
Jordan	35.50%	28.9	10,101,694
Saudi Arabia	35.40%	28.5	34,268,528
Qatar	35.10%	29.2	2,832,067

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## Comparing Estimates across countries 2013

Country/Region	Overweight	Obese	Overweight	Obese	Overweight	Obese
American Samoa	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Algeria	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Anguilla	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Antigua and Barbuda	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Argentina	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Aruba	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Australia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Austria	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Bahamas	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Bahrain	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Barbados	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Belgium	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Belize	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Benin	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Bermuda	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Bhutan	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Bolivia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Bosnia and Herzegovina	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Brazil	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Brunei Darussalam	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Bulgaria	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Burkina Faso	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Burundi	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Cambodia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Cameroon	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Canada	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Cape Verde	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Cayman Islands	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Central African Republic	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Chad	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Chile	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
China	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Colombia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Costa Rica	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Cote d'Ivoire	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Cuba	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Cyprus	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Czechia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Dominica	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Dominican Republic	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Ecuador	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Egypt	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
El Salvador	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Equatorial Guinea	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Eritrea	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Estonia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Ethiopia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Fiji	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Finland	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
France	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
French Polynesia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Gabon	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Gambia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Germany	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112

All charts on this slide are for understanding only, none of them should be memorized

Country/Region	Overweight	Obese	Overweight	Obese	Overweight	Obese
Guatemala	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Honduras	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Hong Kong	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Hungary	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Iceland	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
India	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Indonesia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Israel	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Italy	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Jamaica	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Japan	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Jordan	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Kazakhstan	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Kenya	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Korea	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Kuwait	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Kyrgyzstan	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Laos	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Latvia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Lebanon	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Lesotho	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Lithuania	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Luxembourg	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Macao	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Madagascar	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Malawi	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Malaysia	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Maldives	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Mali	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Malta	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Mexico	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Moldova	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Morocco	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Mozambique	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Myanmar	22,119,281	19,044,800	30,120,373	28,129,280	29,222,262	31,179,112
Nepal	22,119,281	19,044,800	30,120,373	28,		



# Attributes associated with obesity

All This page from Female's Slides

1-Race/Ethnicity

2-Age

3-Sex

4-Income

5-Education

6-Geography and Culture

## Race/Ethnicity

Adults

47% non-Hispanic black  
46.8% Hispanic  
37.9% non-Hispanic white  
12.7% non-Hispanic Asian

Children/Adolescents

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, **Does the BMI that causes diseases in this race cause diseases in the other race?**

## Income

- ❖ **Higher incomes** associated with **decreased** risk of **obesity** in women, but increased risk in non- Hispanic black men & 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 & undernutrition, they are also experiencing a rapid upsurge in noncommunicable disease risk factors such as obesity & overweight, particularly in urban settings.
- ❖ It is **not uncommon** to find **undernutrition & obesity** co-existing within the same country, the same community & the same household.

## Education

Dr said: ( Low education → high risk of obesity)

- ❖ Education is the socioeconomic indicator which has been reported to be the most significant predictor of diet quality.
- ❖ 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.

## Age

Adults (20+)

39.6% ages 20-39  
42.8% ages 40-59  
41% ages 60+

Children/Adolescents  
(it's much less)

13.9% ages 2-5\*  
18.4% ages 6-11  
20.6% ages 12-19

## Sex

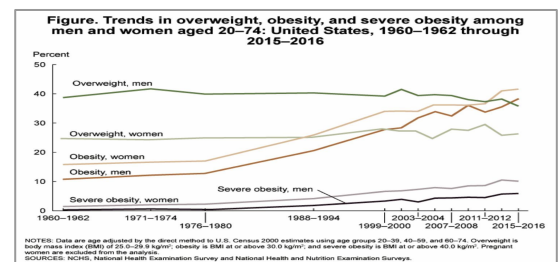
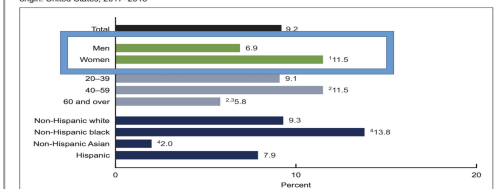


Figure 3. Age-adjusted prevalence of severe obesity among adults aged 20 and over, by sex, age, and race and Hispanic origin: United States, 2017–2018



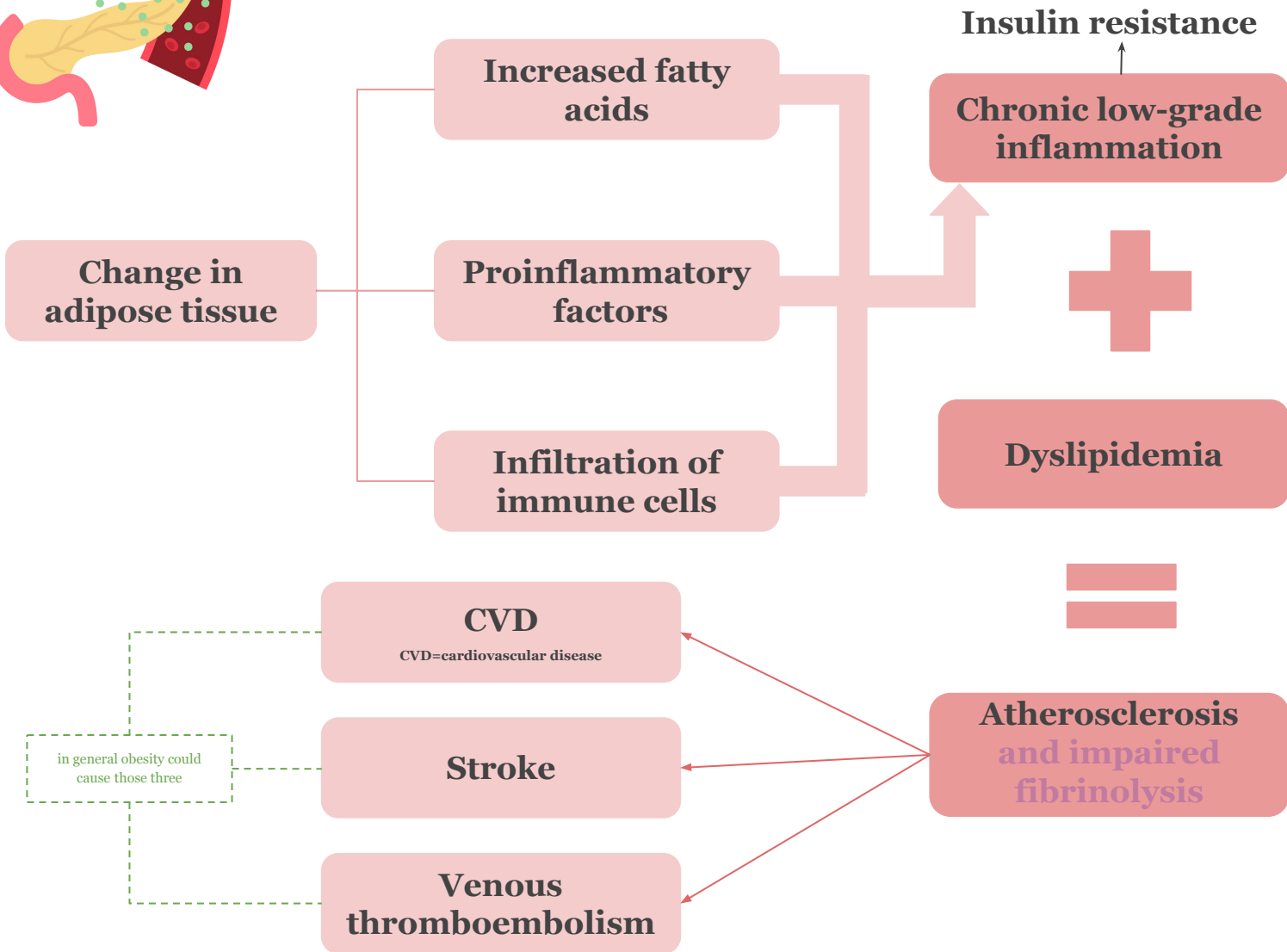
## Geography & Culture

- ❖ 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 & physical activity environments.
- ❖ Limited **food** access, availability, affordability.



5

# Pathophysiology of obesity



## Risk factors for obesity

Genetic

Hormonal

Environmental

Behavioral

## Genetic risk factors for obesity

- ❖ Parents who are obese (family history).
- ❖ Genetic disorders: Trisomy 21 (Down's Syndrome), Prader-Willi Syndrome, Albright's hereditary osteodystrophy, Leptin deficiency, Leptin receptor mutations, Melanocortin 4 receptor disorders.
- ❖ Potential gene variants affecting hunger or metabolism, interacting with environmental influences, (some people have problems with hunger, so when they are full or hungry, they don't have that sense of fullness, it's a gene variation that causes it, 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



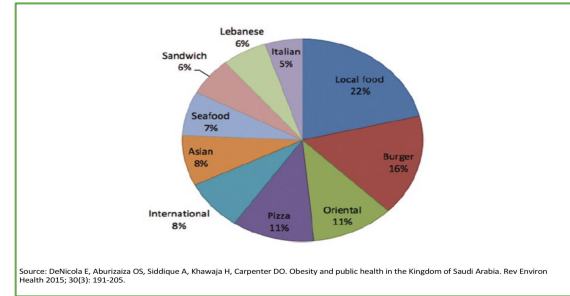


# Risk factors for obesity

## Hormonal risk factors for obesity

- ❖ Cushing syndrome.
- ❖ GH deficiency.
- ❖ Hypothyroidism.
- ❖ Hypothalamic obesity.
- ❖ Polycystic ovary syndrome (PCO).
- ❖ Hyperprolactinemia.

Top Ten restaurant types searched on phone-apps in 2013



## Environmental/Societal Risk Factors for Obesity

1. Low income. (because consume low quality & high carb food like chips)
2. Parents' bad habits for food & physical activity
3. Living far away from parks. (which makes people more less active)
4. Food insecurity (no sufficient quantity of affordable healthy food). because usually healthy food are more expensive
5. Dangerous neighborhoods. (so they don't go outdoor)
6. Difficulty accessing places with healthy food options (Food desert).

## Behavioral Risk Factors for Obesity

- ❖ Nutrition & diet.
- ❖ Physical activity.
- ❖ Sleep.
- ❖ Stress.

## Adverse behavior (only in female's slides)

Diets high in calories, added sugars or fast food		Low physical activity (The energy out should be more than energy in)		Television or other social media	
average daily calorie intake for adults: 2,234	only 19% of americans meet the minimum guidelines	saudi arabia is one of the countries with low physical activity	sedentary activity	increased exposure to food and beverage marketing	over 7.5 hours daily for older children and adolescent





# Other risk factors

All this page from Female's Slides

Extreme birth weight (low or high)

Maternal smoking

Not being breastfed

Disabilities

Medication (steroids, antidepressant)

## Morbidity/Mortality Effects on Population health

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.

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

## Morbidity from childhood obesity

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

## Morbidity associated with obesity

Degree of abdominal fat accumulation is correlated with increased risk of:

- Type two diabetes mellitus
- Non-alcoholic fatty liver disease
- Cardiovascular disease
- Osteoarthritis
- Some cancer
- Hypertension
- Stroke

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

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

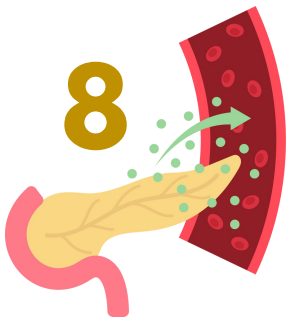
## financial impacts on health care systems (cost):

Medical care costs increasing overtime mostly due to rise in obesity prevalence.

\$147 billion in healthcare costs in 2008(10% of all medical spending).

Socioeconomic costs also related to disability and **premature death.**

Increases in spending from 1998 -2006: -8.5% (\$34.3 billion) Medicare .  
-11.5% (\$27.6 billion) Medicaid.  
-12.9% (\$74.6 billion) commercial insurance.



# Interventions in obesity

## Primary prevention

- preventing obesity before it occurs.
- Regulating caloric energy balance to prevent problematic weight gain by Diet & Physical activity.
- Environmental factors.

### Policy options:

- Tax unhealthy foods/beverages.
- Calorie labeling in food service facilities.
- Food purchasing standards for hospitals/schools .

### Physical activity guidelines:

- 2.5 hours/week for adults.
- 1 hour/day for children/adolescents.
- Physical activity tends to decline as children get older.

## Secondary prevention

### Female's Slides

- Recognize overweight or obese individuals early through screening in order to improve 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 & responses to obesity in order to better target treatments.

## Tertiary prevention (treatment)

- Management of **severe obesity** to reduce complications
- Behavioral modifications
- **Bariatric surgery**, Type 2 diabetes & other comorbidities
- **Medications**, if shown to be effective.
- **Treatment of underlying cause** (if hormonal is caused)

## Address barriers to

### healthy diet:

- Access to healthy food
- Food advertising
- Large portion sizes
- Affordability of healthy food
- Time constraints
- Established behavior

### Physical activity:

- Zoning
- Safety
- Area conducive to physical activity.
- Time constraints
- Establish behavior

## Community-level prevention

### Female's Slides

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

### Community-level interventions (Obesity Prevention Foundation):

1. Educational interventions in schools.
2. Focus on healthy diet/physical activity choices.

## Benefits of weight reduction

Reduction of 5% to 10% of weight is associated with significant reduction in risk for:

- CVD, GERD and HTN.
- Type 2 DM, PCOS and sleep apnea.
- dyslipidemia.
- osteoarthritis.



# Consequences of obesity

## Consequences of obesity for children

1. Hyperandrogenism, PCOS.

2. Puberty (delay in boys, advance in girls).

3. Sleep problems.

4. Poor self-esteem.

5. gastroesophageal reflux disease.

6. Poor dental health.

7. Asthma.

8. Early onset metabolic syndrome.

9. Type 2 diabetes mellitus.

10. Non-alcoholic fatty liver disease (NAFLD).

11. Attention deficit, hyperactivity disorder (ADHD).

Male's Slides

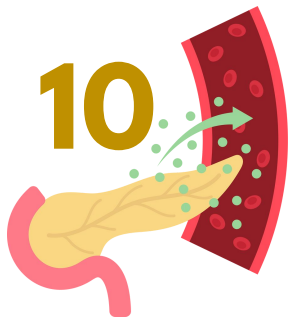
## Consequences of obesity in adults

**Table 1** Morbidities associated with obesity (Hamdy, 2016; Petty, Barry, Pietrzak, & Wagner, 2008; Pi-Sunyer, 2009; Sakai et al., 2005; Smith, Hulse, & Goodnight, 2008; Yospovitch, 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 (CHF), 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, coccygoma, 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 paresthetica
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 acrochordons, 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

## Important Strategies For Maintaining Weight Reduction

Set realistic goals	Continuous support	Prepare the suitable environment	Maintain food diary	Changing lifestyle
5-15% reduction of initial weight	-Availability of healthy food items. -Organized family meal times. -Meal prepping(Plan what you eat ahead of time).			- Modify food intake. -Increase physical activity. -exercise one hour daily. Weigh weekly. Watch < 10 hours of TV/week -Use a weight loss program.



# Preventions of obesity

**In children** (All this page from Male's slides except the summary)

Early stage of prevention:	During infancy:	During pre-school:	School and adolescents
Maternal gestational control.	<ul style="list-style-type: none"> <li>Dietary intake (self-regulation of breastfeeding ↓ risk, early introduction of solid food ↑ risk).</li> <li>Broad spectrum antibiotics (↑ risk).</li> </ul>	<ul style="list-style-type: none"> <li>Response to child temperament.</li> <li>Dietary habits.</li> <li>Reducing screen time.</li> </ul>	<ul style="list-style-type: none"> <li>Physical activity.</li> <li>Peer habits.</li> <li>Educational interventions in schools.</li> </ul>

## Secondary prevention measures obesity in children:

- Provide guidance on nutrition and physical activity.
- Screening for obesity by primary care provider → provide counseling.

## Tackling factors affecting childhood obesity: (found in female and male)



## Prevention of childhood obesity at community level

- Provide services for obesity prevention and treatment (BMI screening, well-visit).
- Promote healthy food & beverages & physical activity at schools.
- Maintain safe neighborhoods.
- Encourage going into parks and physical activity (especially summer vacation).
- Availability of healthy food resource in all communities.
- Funding research for childhood obesity

## Preventing obesity in adults

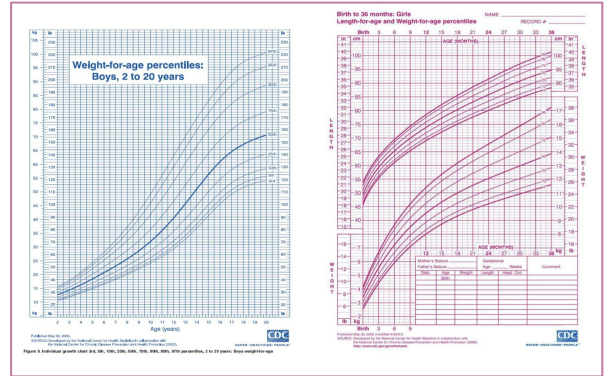
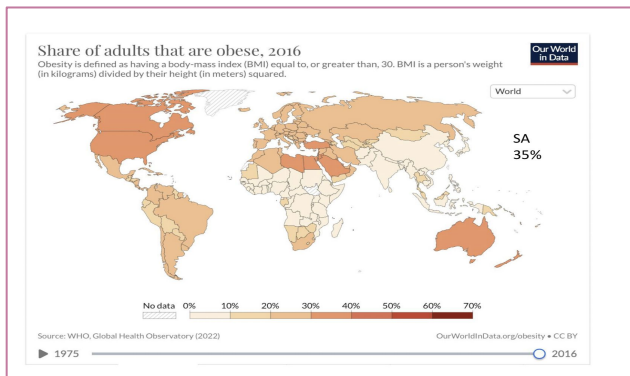
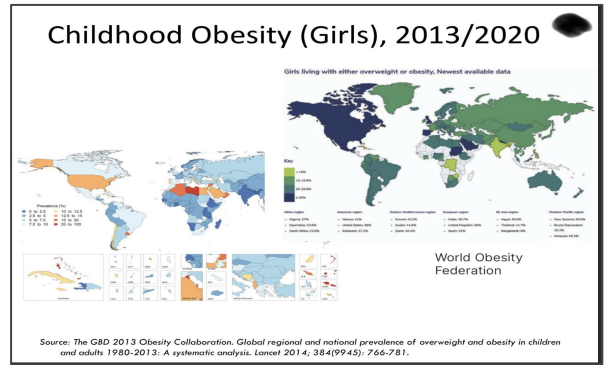
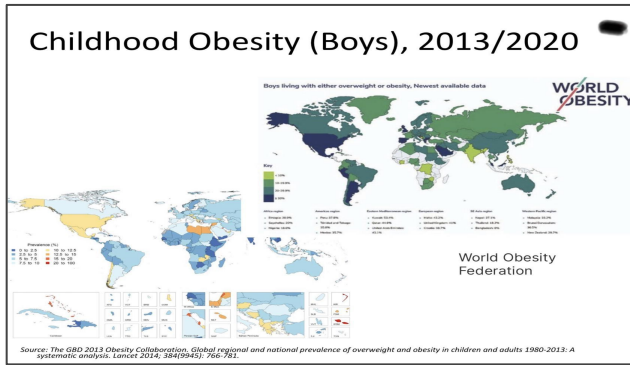
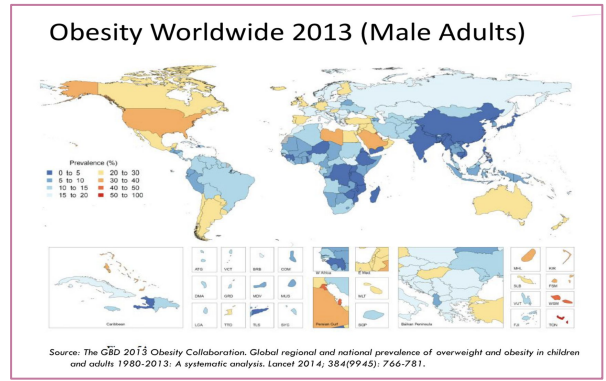
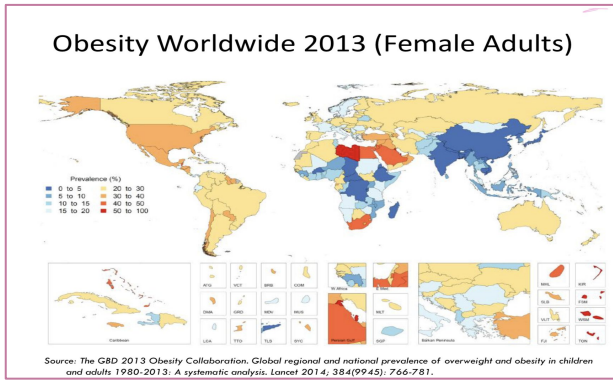
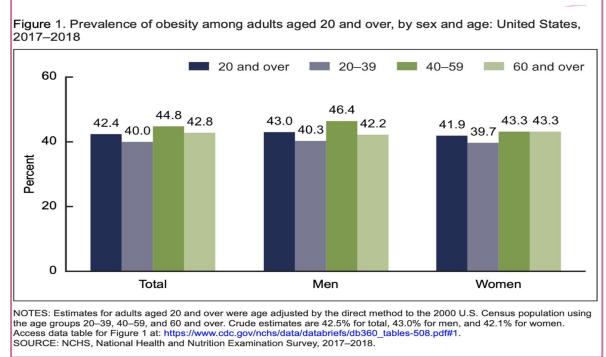
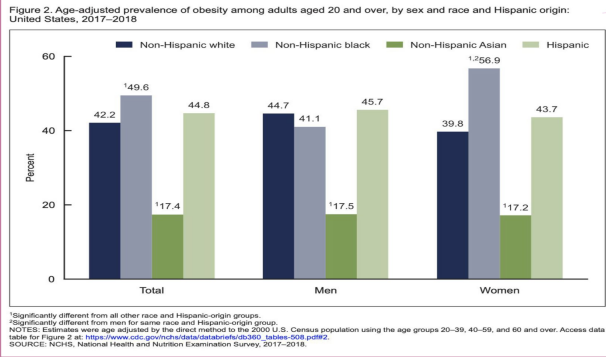
- Educate and promote **healthy lifestyle**.
- Promote social and environmental situation that prevents weight gain.
- Involve different stakeholders in combating this epidemic.
- Develop population based policies that target:
  - Barriers for healthy food and activity.
  - Influence, positive eating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

## Summary

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



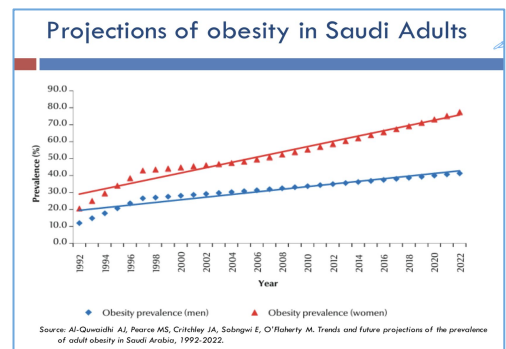
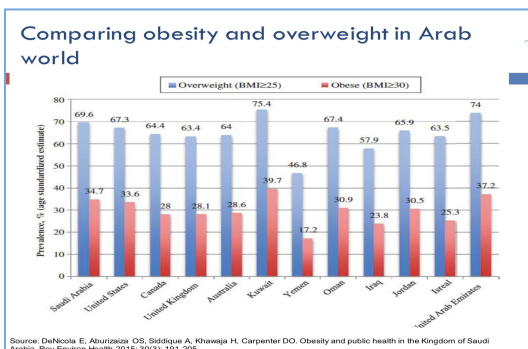
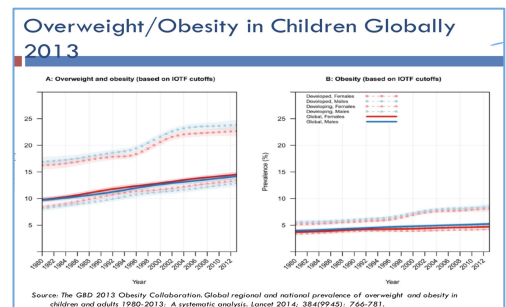
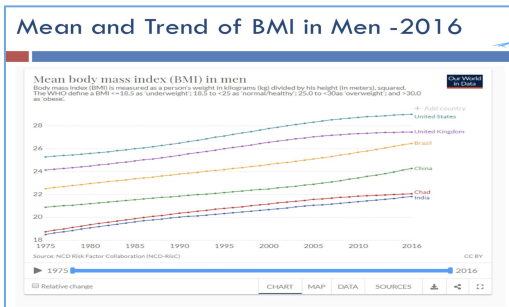
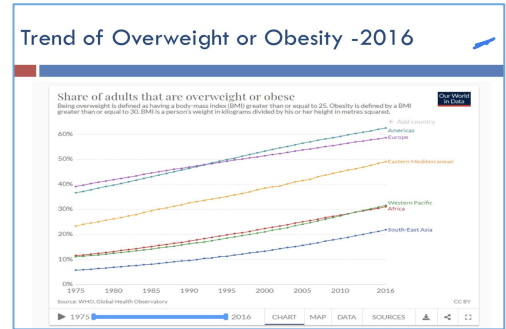
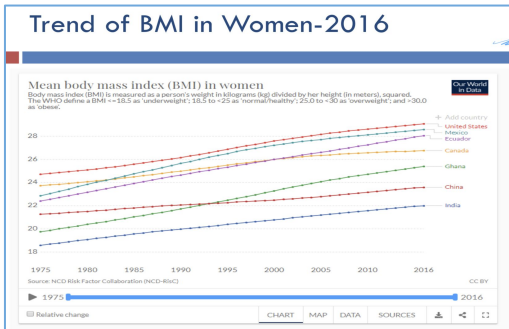
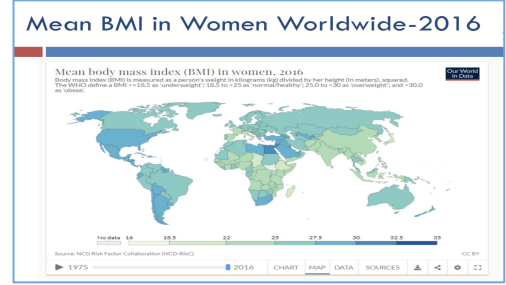
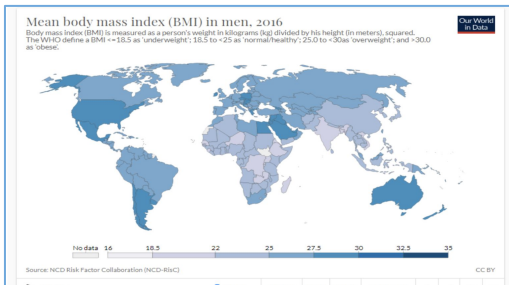
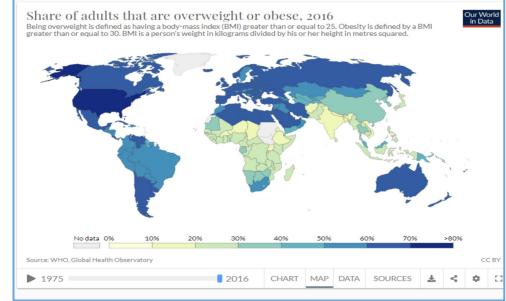
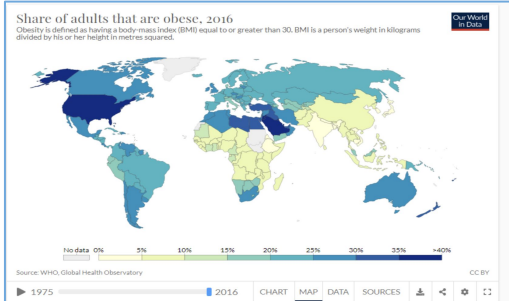
# Charts from slides

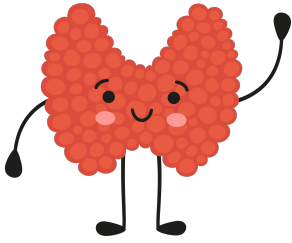






# Charts from slides





# MCQs

Q1

Depending on WHO Criteria in 5-19 years old children how to confirm obesity?

A- 1 SD Above Median BMI.

B- 2 SD Above Median BMI.

C- 3 SD Above Median BMI.

D- 4 SD Below Median BMI.

Q2

Which of the following tests is valid and inexpensive for measuring obesity?

A- BMI.

B- Ultrasound.

C- DXA.

D- Skin Folded Thickness.

Q3

A patient with 33.4 BMI belongs to which obesity category?

A- Normal.

B- Overweight.

C- Mildly Obese.

D- Moderately Obese.



1 - B 2 - A 3 - C



# MEDICINE TEAM

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يزن الأحمري



Leader

رغد المصلح



Member

عبدالله الضويحي



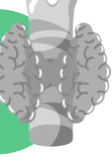
Member

رند أبا الخيل



Member

ريما المطيري



Member

فيصل الشويعر



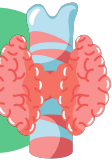
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ريوف الأحمري



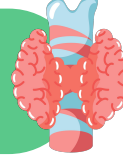
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عبدالعزيز الحميدي



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محمد السلامة



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يزيد السليم



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مشعل الدخيل

