



Epidemiology of Obesity

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OBJECTIVES OF THE LECTURE

At the end of the session you should be able to:

- **1-describe the magnitude of the problem of obesity.**
- **2- Recognize the consequences of obesity.**
- **3- List the factors leading to obesity.**
- **4- Discuss the prevention of obesity**





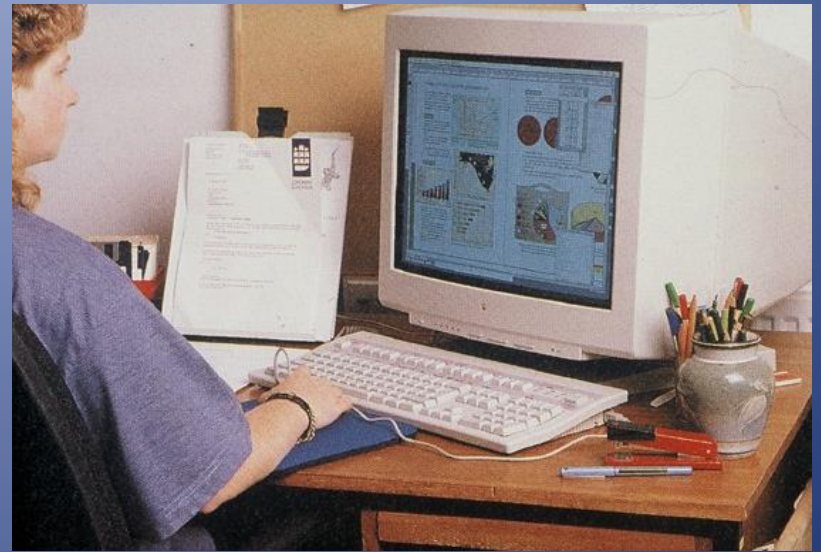
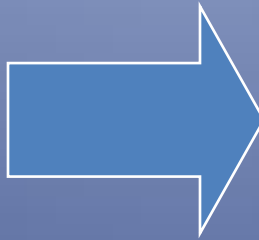
No body is exempted from obesity . It can be you.



Today's obese child == tomorrow's diabetic patient?



From Ancient to ModernWork

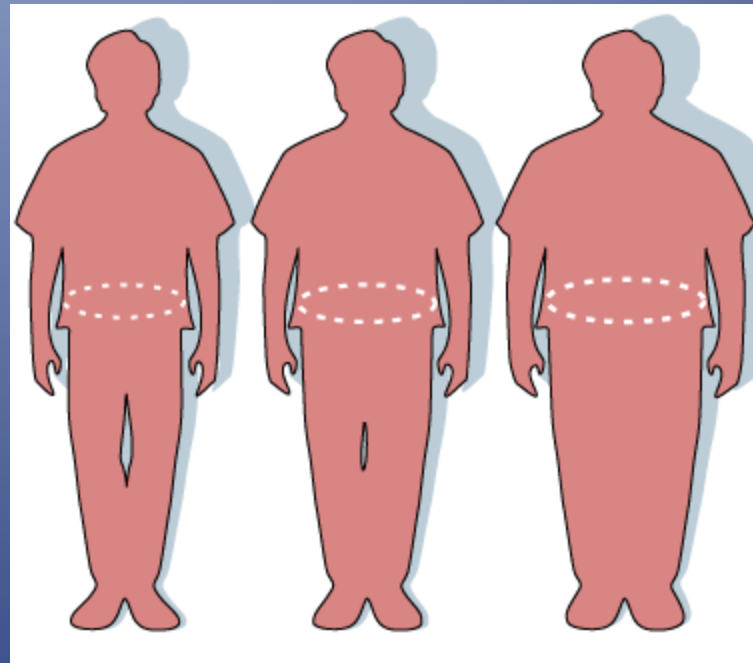


Terms Obesity and Overweight

- Obesity is excessive fat accumulation in adipose tissue to the extent that it can affect health
- When a person is "overweight", it means that they have more body fat than they need for their body to function.
- Weight ranges are greater than what is generally considered healthy for a given height
- Such ranges of weight increase the likelihood of certain diseases and health problems.



Measuring Obesity



Body Mass Index (BMI)

- Calculated from a person's weight and height.
- Reliable indicator of body fatness for most people.
- Inexpensive & easy-to-perform screening for weight categories that may lead to health problems.
- Does not measure body fat directly, but correlates to direct measures of body fat like;
 - Skin fold thickness
 - underwater weighing
 - dual energy x-ray absorptiometry (DXA)
 - alternative for direct measures of body fat.

BMI and Body Fat

- 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.

Obesity classification.

Obesity is divided into three separate classes, with **Class III** obesity being the most extreme of the three.

<i>With a BMI of:</i>	<i>You are considered:</i>
Below 18.5	Underweight
18.5 - 24.9	<i>Healthy Weight</i>
25.0 - 29.9	Overweight
30 or higher	Obese

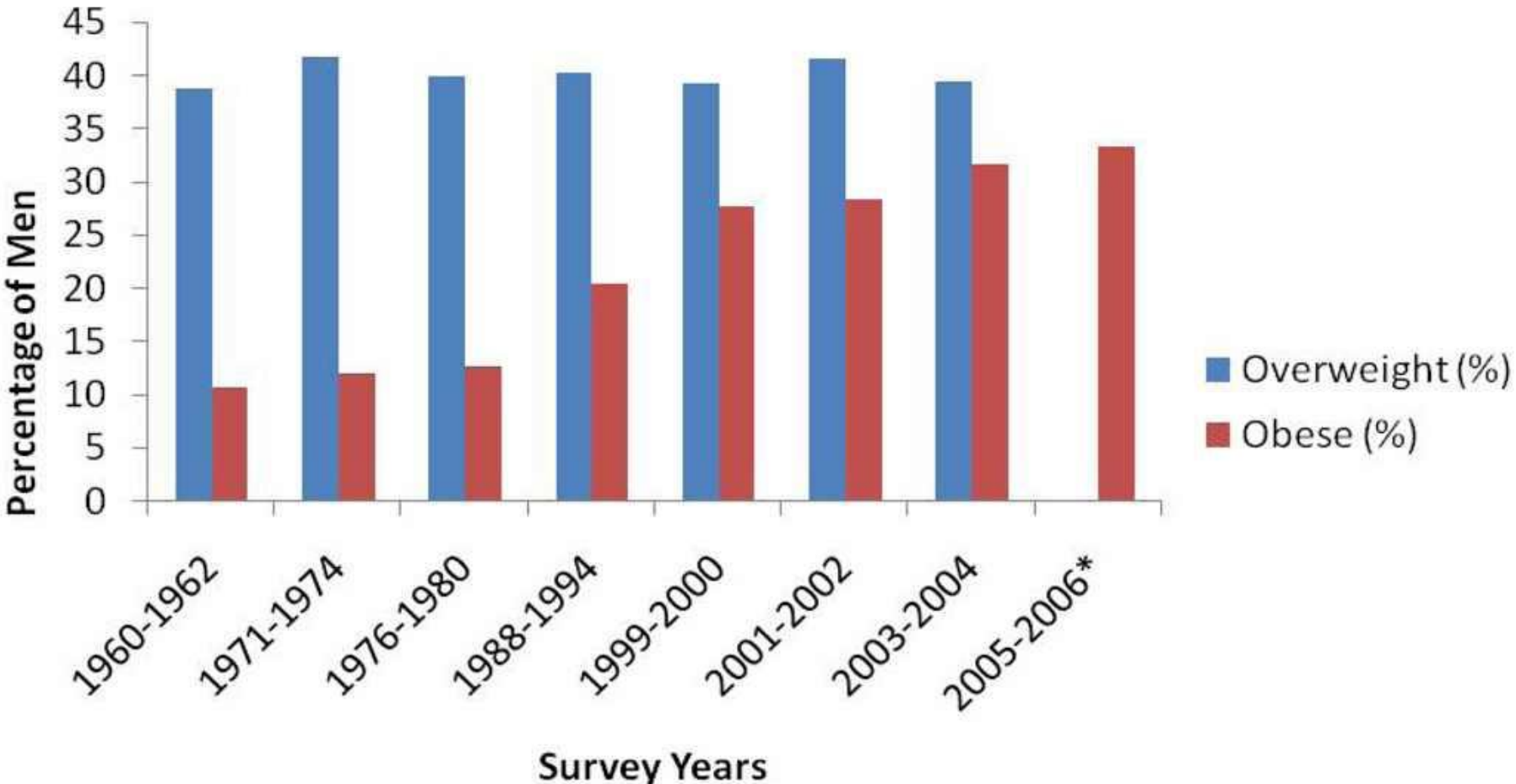
Obesity class	BMI (kg/m ²)
Class I	30.0- 34.9
Class II	35.0-39.9
Class III (Extreme Obesity)	≥ 40.0

A Global Epidemic

Why is obesity accelerating in developing countries?

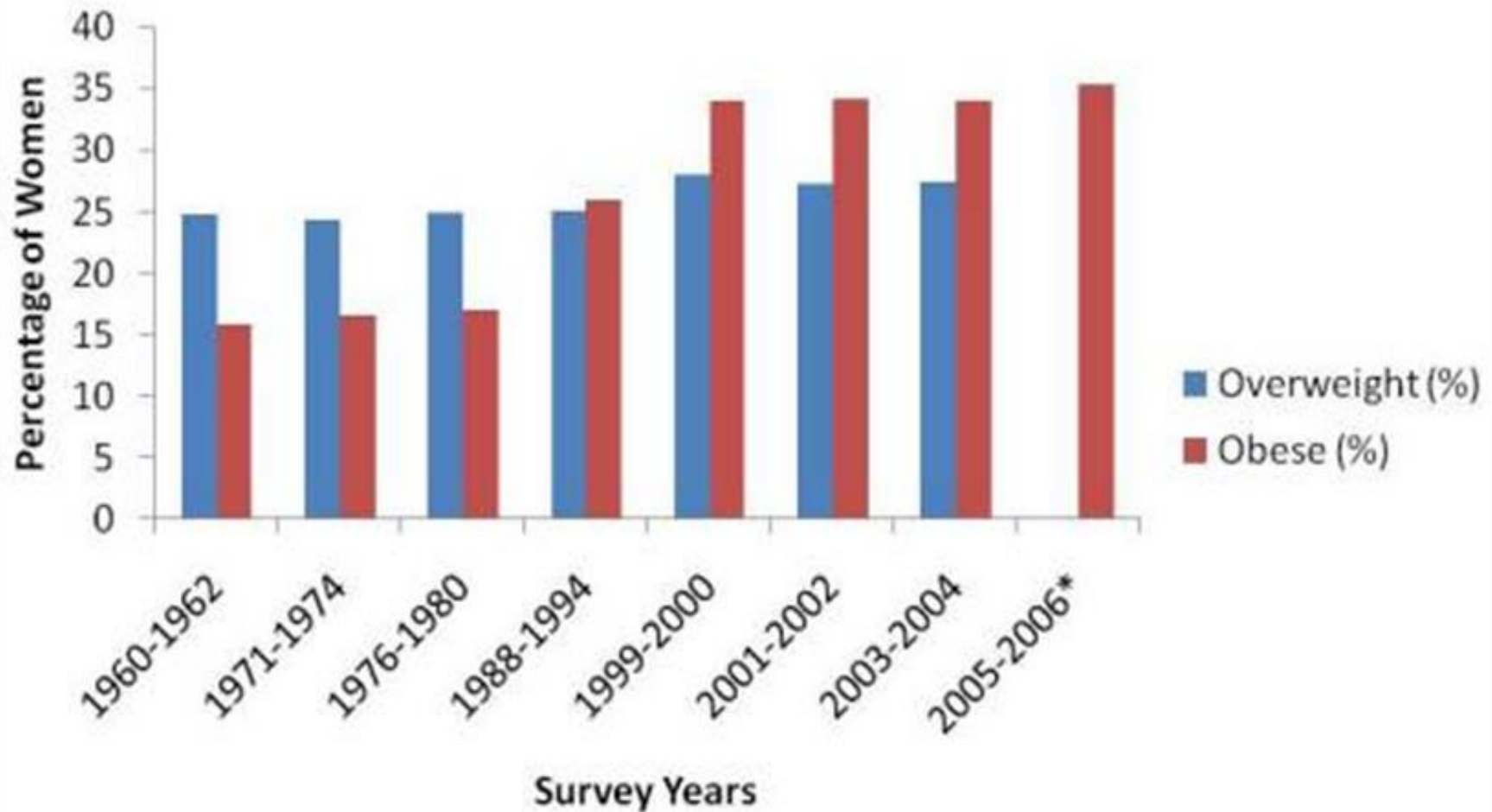
- **Increased consumption of energy dense, nutrient poor foods.**
- **Reduced physical activity.**

Prevalence and Trends of Overweight and Obesity Among men Ages 20–74 Years in the United States: 1960–2006



**data not available for overweight for 2006*

Prevalence and Trends of Overweight and Obesity Among Women Ages 20–74 Years in the United States: 1960–2006



**data not available for overweight for 2006*

Highest obesity*

Men, % of total population

1	Lebanon	36.3
2	Qatar	34.6
3	Kuwait	32.8
4	Panama	27.9
5	United States	27.7
6	Cyprus	26.6
7	Saudi Arabia	26.4
8	West Bank and Gaza	23.9
9	Bahrain	23.3
10	Albania	22.8
11	England	22.7
12	Germany	22.5
13	Scotland	22.3
14	Ireland	20.1
15	Israel	19.9
16	Mexico	19.4
17	Australia	19.3
18	United Arab Emirates	17.1
19	Wales	17.0
20	Oman	16.7
21	Slovenia	16.5
	Turkey	16.5
23	Lithuania	16.2
24	Canada	16.0
	Peru	16.0
26	Luxembourg	15.3
27	Sweden	14.8
28	Portugal	14.5
29	Switzerland	14.1
30	Mongolia	13.8

Women, % of total population

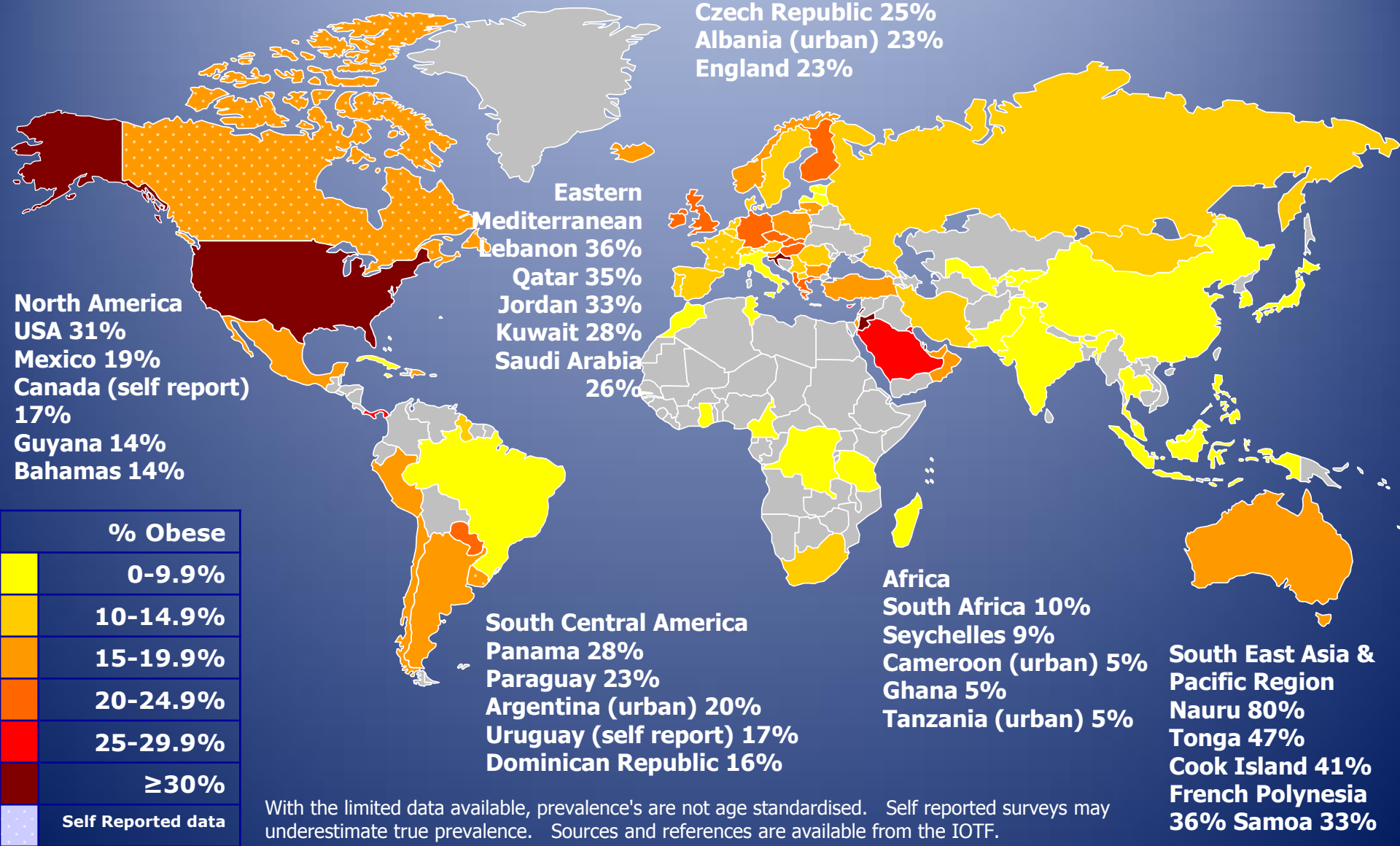
1	Qatar	45.3
2	Saudi Arabia	44.0
3	West Bank and Gaza	42.5
4	Lebanon	38.3
5	Panama	36.1
6	Albania	35.6
7	Bahrain	34.1
8	United States	34.0
9	Egypt	32.4
10	United Arab Emirates	31.4
11	Iran	30.0
12	Kuwait	29.9
13	Turkey	29.4
14	Mexico	29.0
15	Scotland	26.0
16	Israel	25.7
17	Mongolia	24.6
18	Jamaica	23.9
19	England	23.8
20	Cyprus	23.7
21	Germany	23.3
22	Oman	23.1
23	Peru	23.0
24	Australia	22.2
25	Morocco	21.7
26	Russia	21.6
27	Trinidad & Tobago	21.1
28	Fiji	19.3
29	Mauritania	19.2
30	Wales	18.0

* Data for these health rankings refer to the latest year available, 1999-2003. Obesity is defined as body-mass index of 30 or more

Source: "Pocket World in Figures", based on data from the World Health Organisation

Global Prevalence of Obesity in Adult Males

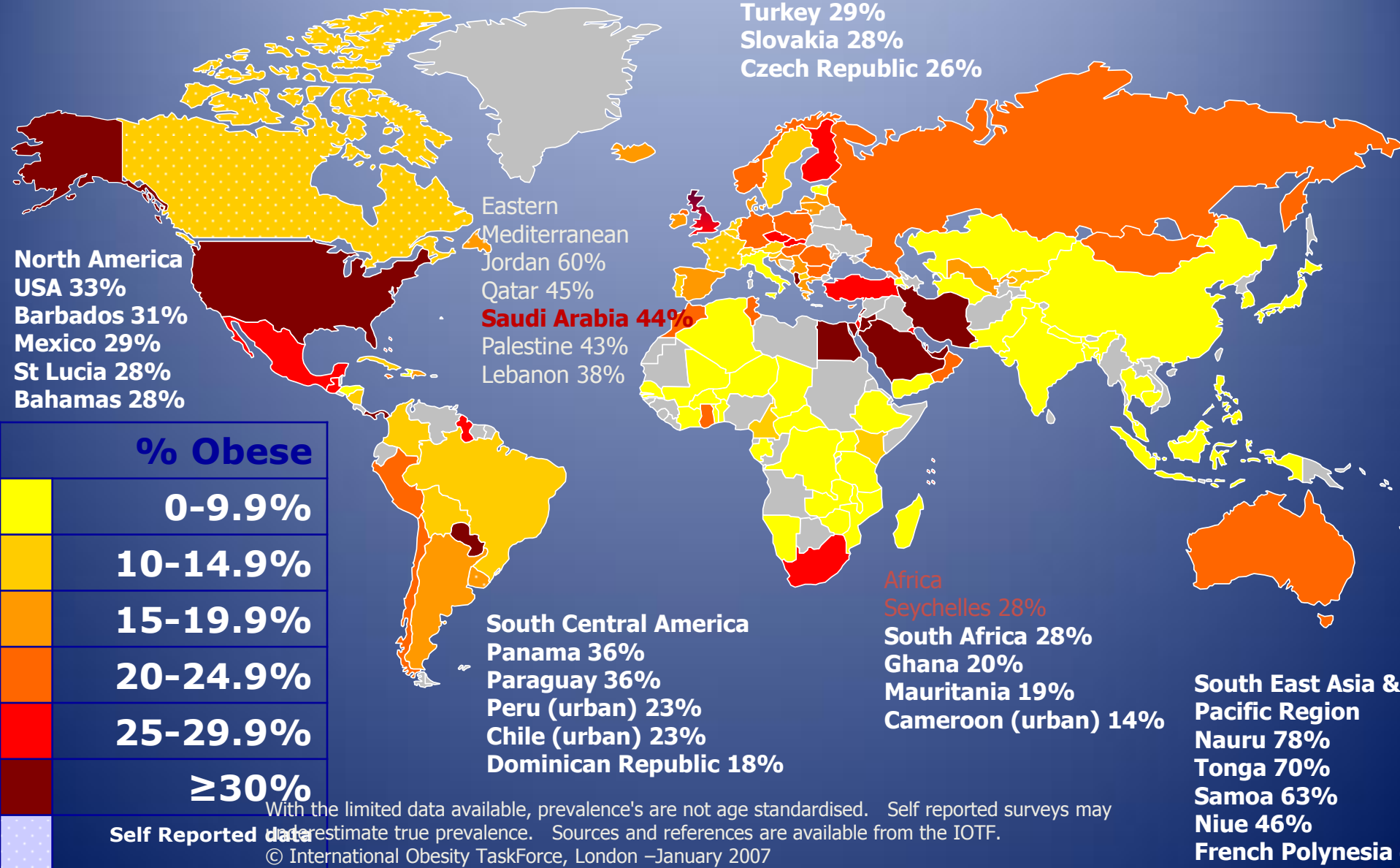
With examples of the top 5 Countries in each Region



With the limited data available, prevalence's are not age standardised. Self reported surveys may underestimate true prevalence. Sources and references are available from the IOTF.
 © International Obesity TaskForce, London –January 2007

Global Prevalence of Obesity in Adult Females

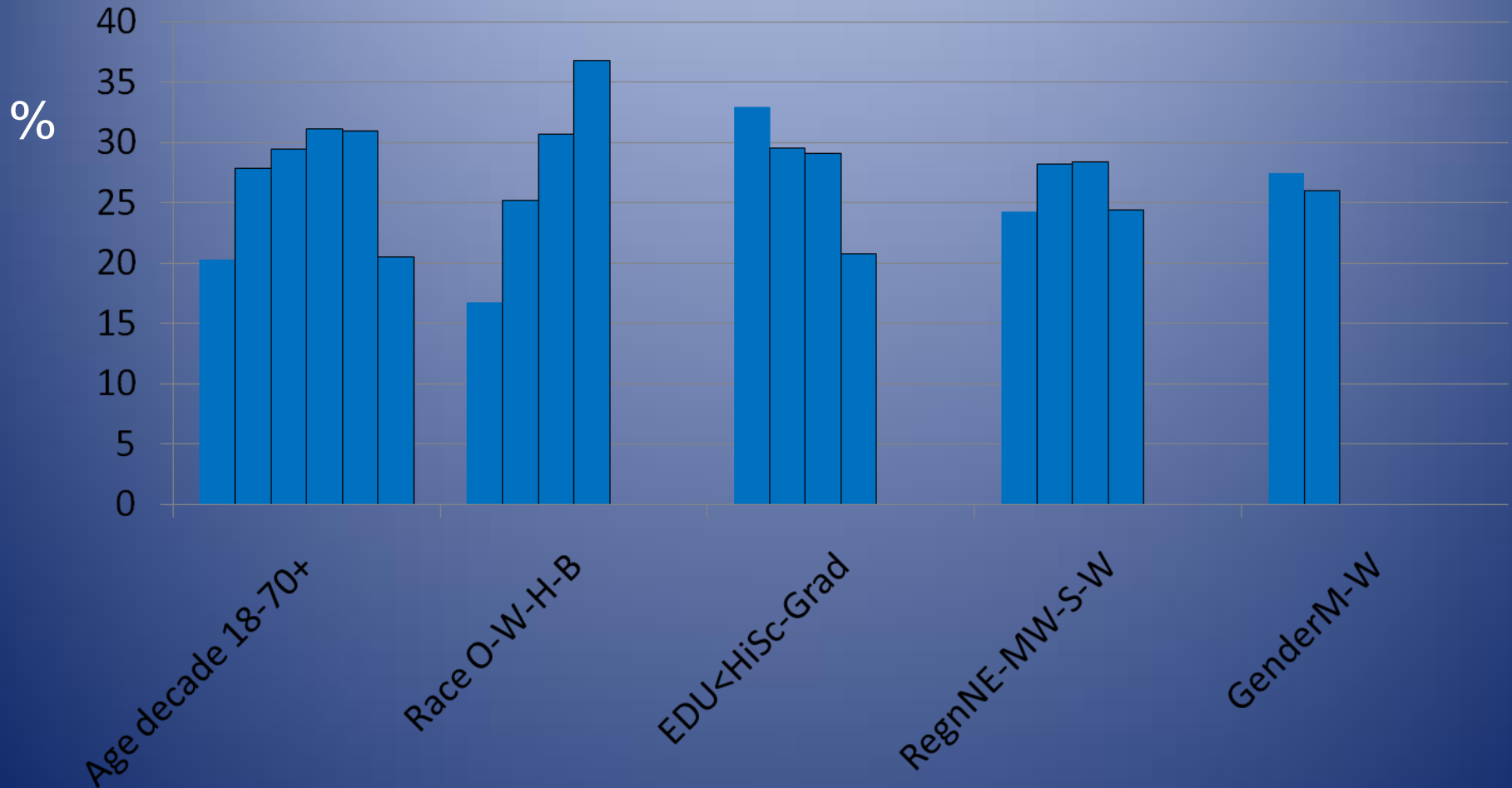
With examples of the top 5 Countries in each Region



Data from KSA National Surveys

Studies by National Surveys KSA	Age group	Prevalence Obesity BMI>30kg/m ²		Prevalence Overweight BMI 25-29.9 kg/m ²		Self eported Physical inactivity	
		Male	Female	Male	Female	Male	Female
1990-93 (n=13177)	>15years	16%	20.26%	27.23	25.20	43.3%	84.7%
1995-2000 (n=17232)	>30 years	26.4%	44.0%	42.4%	31.8%	93.9%	98.1%

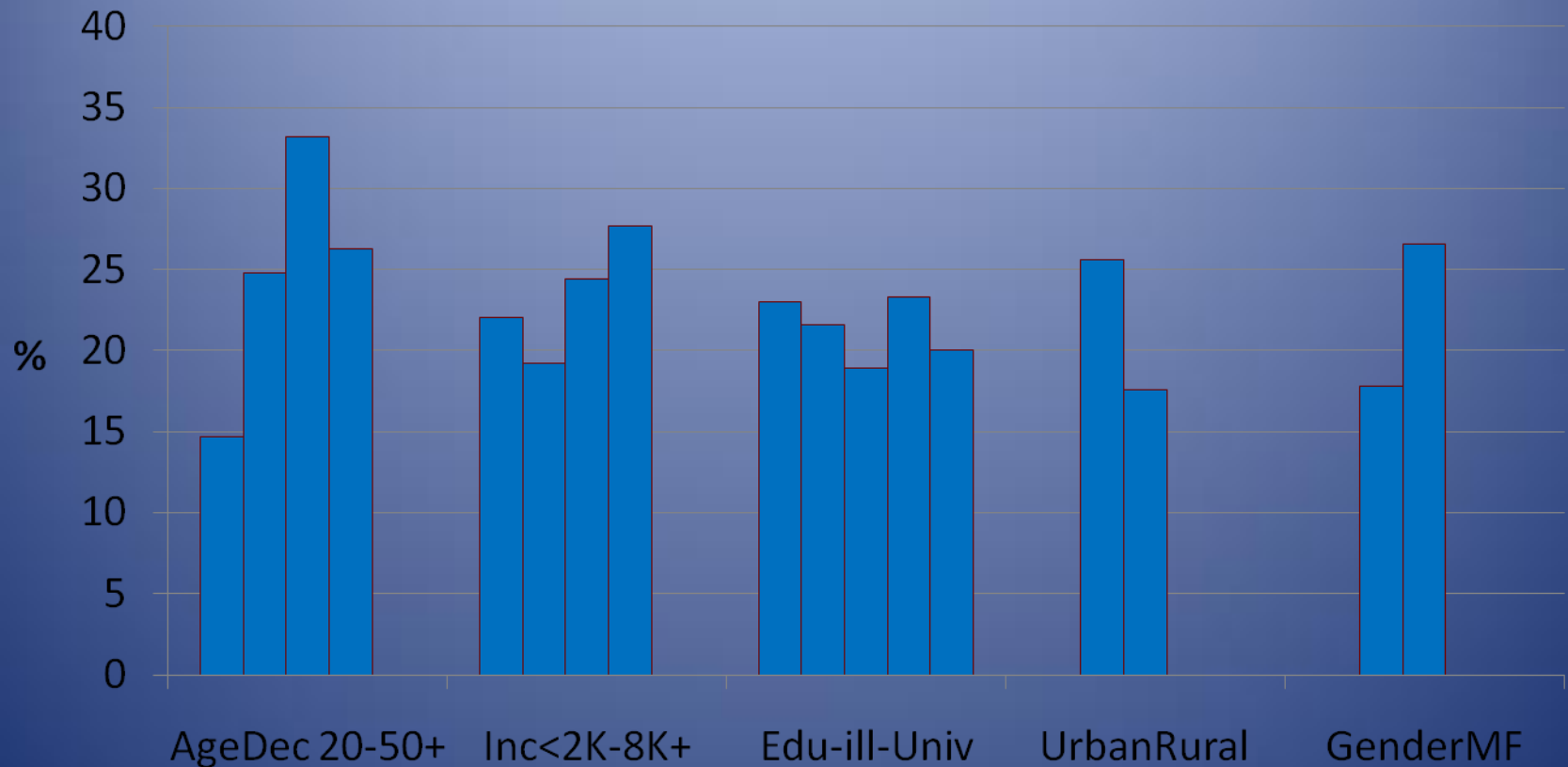
Demographic Prevalence of Obesity (BMI_≥30) : USA MMWR August 2010



O=other, W=white, H=Hispanic, B=Blacks

Region: NE=North east, MW=Midwest,
S=South, W=west

Demographic Prevalence of Obesity in Saudi Arabia (BMI \geq 30kg/m²) 1990-1993



Other (local) studies showing the prevalence of obesity and overweight

Author , and place of study	Age group	No of subjects	Criteria used	Prevalence among Males%	Prevalence among Females%
Khashoggi et al (1994) Attendees at PHC Jedahh	11-70 years Mean age 32.2	852 female	Obese BMI >30 Overweight BMI 25-29.9	---- ----	64.3 26.8
AL- Shammati et al (1994b) Attendees at PHC, Riyadh	Mean male = 34 y Female 32 y	733 With back pain	Obese BMI >30 Obese BMI >30	 51.6	47.0
AL- Jassir et al (1998) Employees of M.O.H Riyadh	20 yrs and above	1238 males	Overweight BMI 25-29.9 Obese BMI >30	40.3 18.4	----

Causes of Obesity



Causes of Obesity

- **Not necessarily overeating.**
- Factors that predispose a person to gain excessive weight gain.
 - Eating patterns Eating environment
 - Food packaging Food availability
 - Body image Physical inactivity
 - Basal body temp Dietary thermogenesis
 - Fidgeting Biochemical differences
 - Quantity & sensitivity to satiety hormones

Causes of Obesity

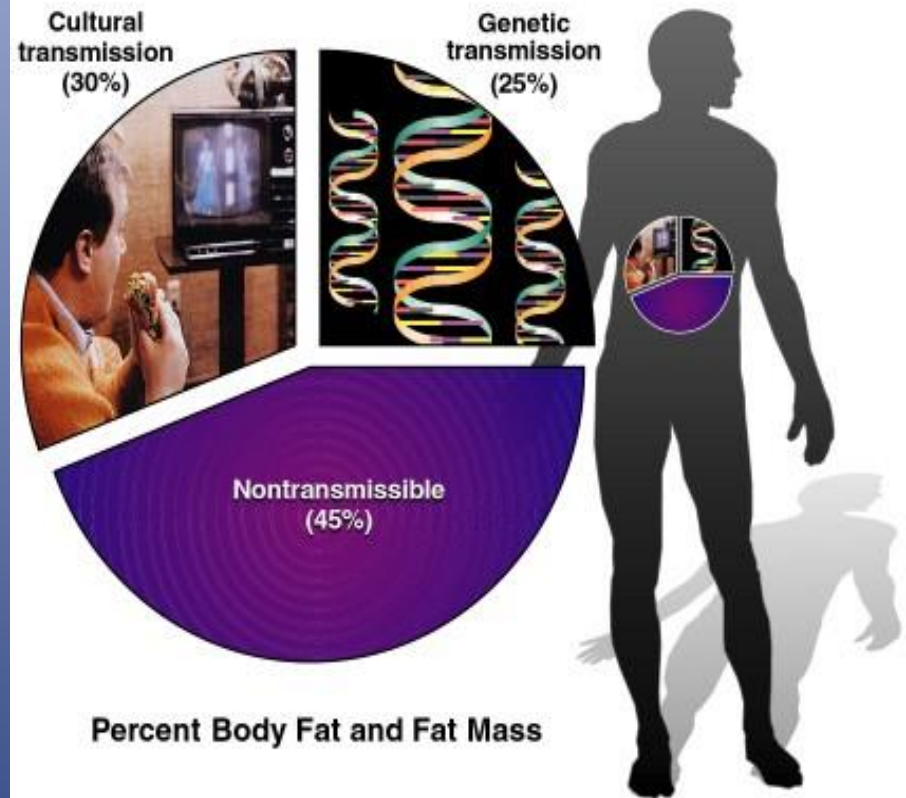
- **Characteristics of fast food linked to increased adiposity:**
 - Higher energy density
 - Greater saturated fat
 - Reduced complex carbohydrates & fiber
 - Reduced fruits and vegetables.



Causes of Obesity

- **Genetics plays a role.**
 - How much variation in weight gain among individuals can be accounted for by genetic factors?
 - Largest transmissible variation is cultural.

19.1. Total transmissible variance for body fat.



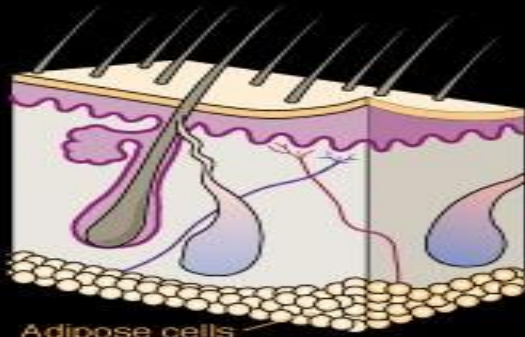
Percent Body Fat and Fat Mass

Causes of Obesity

- A satiety hormone that influences the appetite control in the hypothalamus.
- There is a role of a mutant “obese” gene in obesity development.

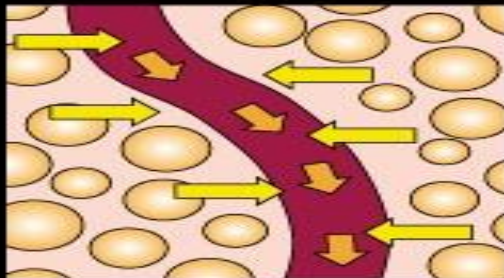
Causes of Obesity

19.2. Genetic model for obesity



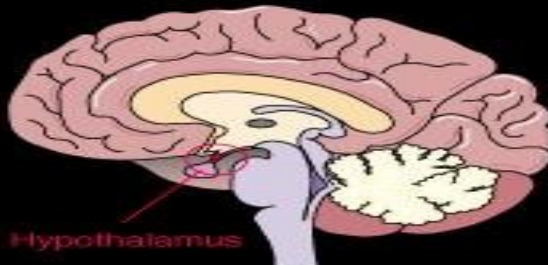
Step 1

The gene inside of the fat cell creates a hormone responsible for satiety



Step 2

The satiety hormone moves from the fat cells and enters the bloodstream



Step 3

The satiety hormone signals the hypothalamus to reduce or stop the drive to eat after the "set point" is reached for the body's total quantity of fat.

Causes of Obesity

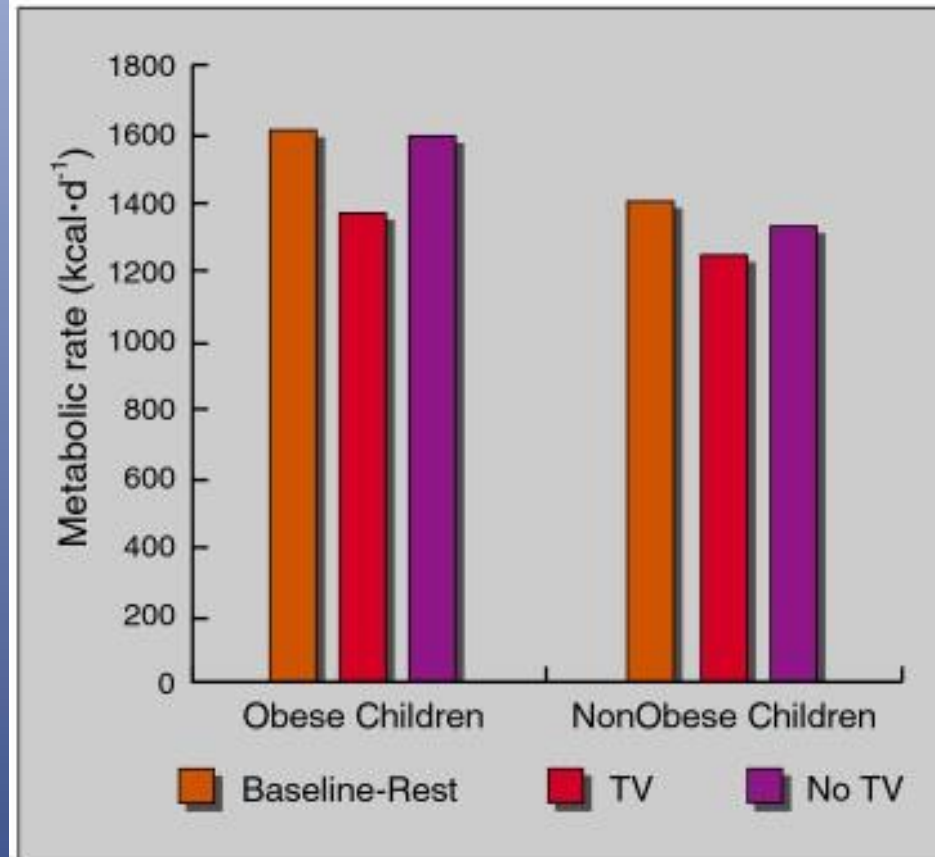
A defective ob gene causes **inadequate leptin production**. Thus, the brain receives an under assessment of body's adipose stores and urge to eat.

In addition to deficient leptin production, scientists also propose the possibility of **defective receptor action** (via a leptin receptor molecule on brain cells), which increases a person's resistance to satiety.

Causes of Obesity

- Physical Activity: an important component
- For young & middle aged men, physical activity relates inversely to body fat levels.
- No relationship between caloric intake and body fat levels.

19.1CU. Childhood obesity.



Complications of obesity

Children & 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.

Visceral Vs Peripheral

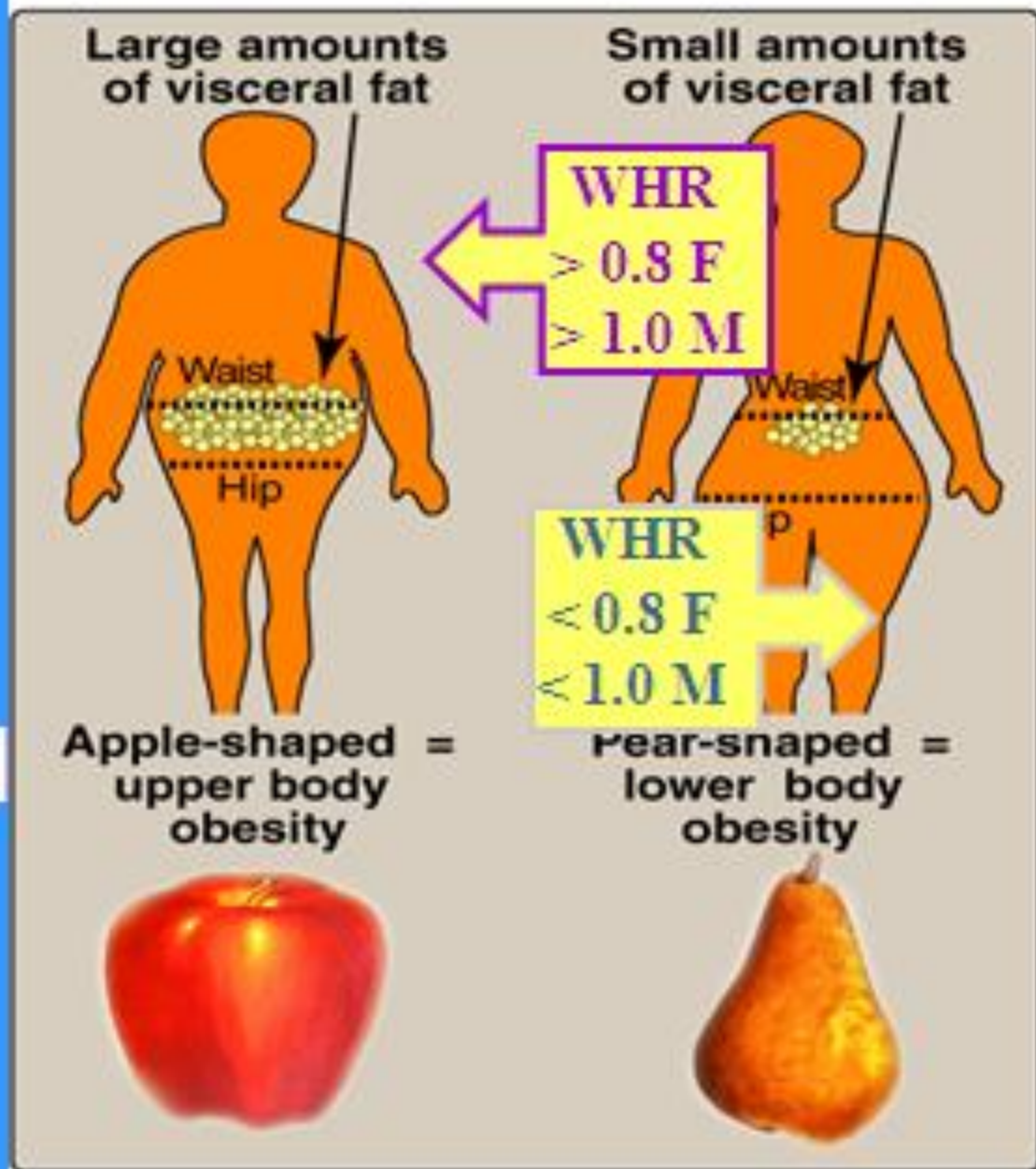


Figure 26.3

Individuals with more upper body fat (left) have greater health risks than pear-shaped individuals (right).

Abdominal body fat increases health risks

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

- ◆ **Cardiovascular disease¹**
- ◆ **Type 2 diabetes^{2,3}**
- ◆ **Premature death⁴**
- ◆ **Some types of malignancies⁵**

¹Hubert HB et al. Circulation 1996; 93: 1372–9

²Colditz GA et al. Am J Epidemiol 1990; 132: 501–13

³Chan JM et al. Diabetes Care 1994; 17: 961–9

⁴Soloman CG, Manson JE. Am J Clin Nutr 1997; 66 (Suppl. 4): 1055S–50S

⁵Schapira DV et al. Cancer 1994; 74: 632–9



Obese Syndrome Components



- **Glucose intolerance**
- **Insulin resistance**
- **Dyslipidemia**
- **Type 2 diabetes**
- **Hypertension**
- **Elevated plasma leptin concentration**
- **Increased visceral adipose tissue**
- **Increased risk of CHD & some cancers**

10kg Weight Loss in 100kg Patient With Obesity Related Co-morbidities

- ◆ **Mortality 20-25% fall in total mortality**
30-40% fall in diabetes related deaths
40-50% fall in obesity related cancer deaths
- ◆ **Blood pressure fall of approximately 10mm/Hg in both systolic and diastolic values**
- ◆ **Reduces the risk of developing diabetes by >50%**
Fall of 30-50% F. glucose. Fall of 15% HbA1C
- ◆ **Lipids:**
Fall of 10% in total cholesterol
Fall of 15% LDL
Fall of 30% triglycerides
Increase of 8% in HDL

Approach to Obesity at Clinical level

- A full history with a dietary inventory and an analysis of the subject's activity level.
- Screening questions to exclude depression
- Screening for eating disorders as 30% of patients suffer from them
- Determine any co-morbidities;
- Exclude the possible and rare secondary causes
- Requirements of treatment and belief to fulfill
- Behavior assessment for readiness
- Family support, time and financial considerations

Approach at community level

- Empowering parents, and caregivers
- Healthy foods in schools & restaurants
- Access to healthy affordable food
- Avenues for physical activity (www.letsmove.gov)
- Safe neighborhoods; playgrounds, parks
- Physical education in schools/child care facilities
- Encourage breast feeding
- Farmers markets; local fruits and vegetables available
- Any barriers considered

Approach to control epidemic of obesity and overweight

- **Early recognition & awareness**
- **Prompt action by individuals, parents, families physicians, communities & others**
- **Policies for conducive Environment**
- **Increased physical activity in all age groups**
- **Nutrition: Breast feeding & dietary determinants**
- **Behavior modifications at all levels, and by all health seekers and health providers**
- **Behavioral surveillance programs to detect changes**
- **Research at basic, clinical, and public health levels**

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 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.

Thank You