Risk factors for NCDs

Important lecture

Objectives

- Definition of risk factors and metabolic risk factors.
- Common risk factors for NCDs.
- More in-depth discussion on 4 leading NCDs, 4 behavioral/lifestyle risk factors, and 4 metabolic risk factors:
  - Definition
  - Global burden
  - Health effects
- **OSCE**

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COMMUNITY MEDICINE

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Editing File

Types of NCDs

- Cardiovascular disease (e.g. coronary heart disease, stroke) (considered a major killer)
- Cancer
- Chronic respiratory disease
- Diabetes
- Chronic neurologic disorders (e.g.,Alzheimer's, dementias)
- Arthritis/Musculoskeletal diseases especially back pain.
- Unintentional injuries (e.g., from traffic crashes)

Risk Factors

- "An aspect of personal behavior or lifestyle, an environmental exposure, or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, injury, or other health condition".

| Modifiable Risk Factors[4]	Non-Modifiable Risk Factors
A behavioral risk factor that can be reduced or controlled by intervention, thereby reducing the probability of disease.	A risk factor that **cannot** be reduced or controlled by intervention
WHO has prioritized the following four: - • Physical inactivity • Tobacco use • Alcohol use [1] • Unhealthy diets - Increased fat and sodium, with low fruit and vegetable intake	for example: • Age • Gender • Race • Family history • Genetics

Metabolic Risk Factors :

- "Metabolic" refers to the biochemical processes involved in the body's normal functioning.
- Behaviors (modifiable risk factors) can lead to metabolic/physiologic changes.
- WHO has prioritized the following four metabolic risk factors:
  1. Raised blood pressure.
  2. Raised total cholesterol.
  3. Elevated glucose.
  4. Overweight and obesity [3]
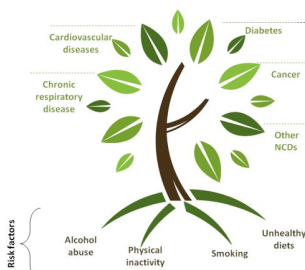
	Tobacco[5]	Unhealthy diet	Physical inactivity	Alcohol
CVD [2]	✓	✓	✓	✓
Diabetes	✓	✓	✓	✓
Cancer	✓	✓	✓	✓
CRD [2]	✓			

1. Harm depends on the amount and frequency of use
2. CVD = Cardiovascular Disease; CRD = Chronic Respiratory Disease
3. It leads to low grade inflammation
4. We Target these RF since it can be modified while managing the patient and Because it is responsible for 70-80% of NCD
5. We always correlate tobacco with lung cancer but statistically Tobacco cause more CVD than lung cancer!.

Cardiovascular Disease

Definition:

Cardiovascular disease (CVD) is a group of disorders of the heart and blood vessels, and may include:

Coronary heart disease

Disease of the blood vessels supplying the heart muscle.

Cerebro-vascular disease

Disease of the blood vessels supplying the brain. (Stroke)

Peripheral arterial disease

Disease of blood vessels supplying the arms and legs.
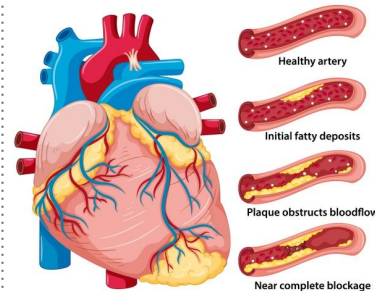
Congenital heart disease

Malformations of heart structure existing at birth not of main focus.

Global Burden:

CVDs are the **#1 cause of death globally.**[2]
- An estimated 17.3 million people died from CVDs in 2016. (31% of all global deaths)
    → 85% are due to heart attacks and strokes
- Over 80% CVD deaths occur in low- and middle- income countries (less Resources).
- By 2030, almost 25 million people will die from CVDs.

CORONARY ARTERY DISEASE

Healthy artery
Initial fatty deposits
Plaque obstructs bloodflow
Near complete blockage

Risk Factors: ⭐

| Major Modifiable Risk Factor	Other Modifiable Risk Factor
• Unhealthy diets • Physical Inactivity • Obesity or Overweight • High Blood Pressure • Tobacco use • Diabetes	• Low socioeconomic status [1] • Heavy alcohol use • Psychosocial stress • Mental ill health (depression) • Use of certain medication • Lipoprotein
Non-Modifiable Risk Factor	**'Novel' Risk Factor**
• Increased age • Family history/genetics • Race African Americans • Gender Male	• Excess homocysteine in blood • Inflammatory markers (CRP) • Abnormal blood coagulation (increased fibrinogen)

1- causes more stress and also due to unhealthy diet.

2-**I am not going to ask you specifically on the statistics number but you should be able in this lecture to know the leading causes regarding each point we are going to talk about**
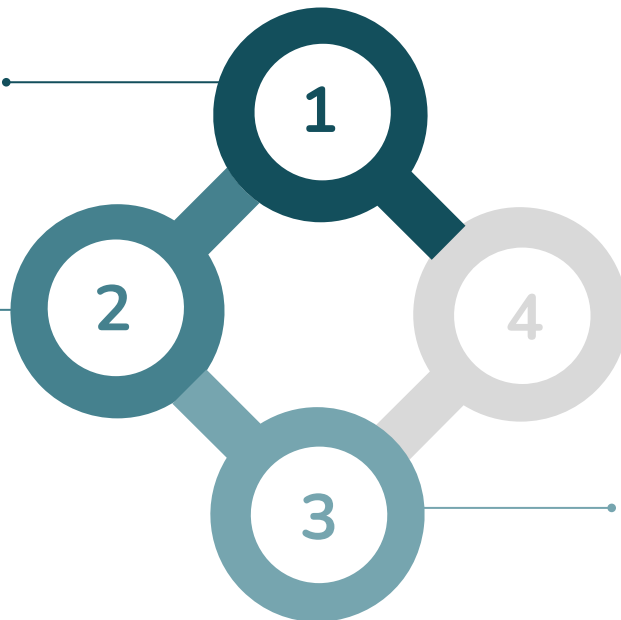
Diabetes

Definition:

- Diabetes is a **disorder of metabolism** — the way the body uses digested food for growth and energy.
- There are 4 types:
  - 1- Type 1 an autoimmune attack against insulin secreting cells in the pancreas
  - 2- Type 2 insulin resistance combined with decreased insulin secretion
  - 3- Gestational diabetes first diagnosed during pregnancy that usually resolves after labor.
  - 4- Prediabetes elevated blood sugar but doesn't meet the clinical definition of diabetes. We care about it alot because we can reverse it by medications and diet
- Type 2 is mainly caused by modifiable risk factors and is the **most common** world wide.
- >90% of all adult diabetes cases are type 2.
- Healthy diet, regular physical activity, normal body weight and avoiding tobacco use can prevent or delay the onset of type 2 diabetes.
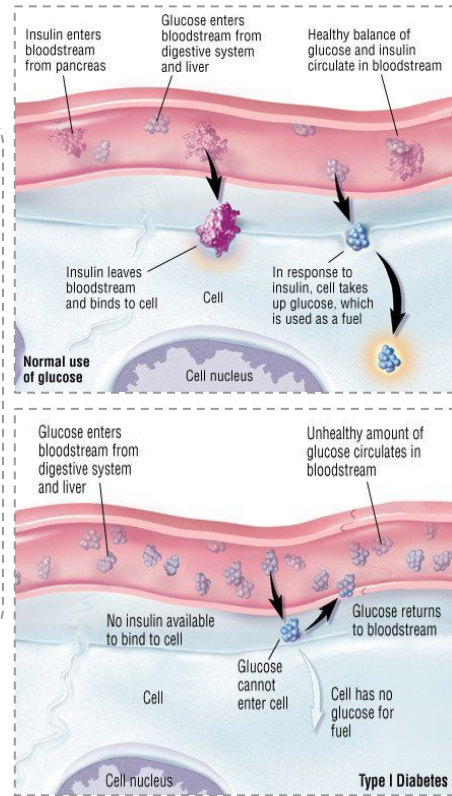
Global Burden:

1 — 422 million people worldwide have diabetes in 2014

2 — In 2014, an estimated 3.8 million people died from consequences of high blood sugar.

4 — WHO projects that diabetes deaths will increase by two thirds between 2008 and 2030.

3 — More than 80% of diabetes deaths occur in low- and middle-income countries.

Risk Factors: ⭐

Major Modifiable	Other Modifiable
- Unhealthy diets - Physical Inactivity - Obesity or Overweight - High Blood Pressure - High Cholesterol	- Low socioeconomic status - Heavy alcohol use - Psychological stress **High consumption of sugar sweetened beverages** - Low consumption of fiber
Non-Modifiable	**Other**
- Increased age - Family history/genetics - Race - Distribution of fat	- Low birth weight - Presence of autoantibodies

Cancer

Definition:

- Generic term for a large group of diseases that can affect any part of the body.
- "Rapid creation of abnormal cells that grow beyond their usual boundaries, and which can then invade adjoining parts of the body and spread to other organs." (WHO, 2012)

Cell Loses Control of Normal Growth
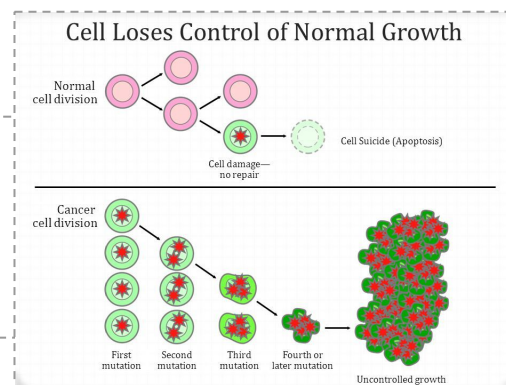
Types of Tumors:

- Benign tumors
- Malignant tumors

Global Burden:

- 9.6 million people died from cancer in 2018.
- 70% of all cancer deaths occur in low- and middle- income countries.
- The total annual economic cost of cancer in 2010 was estimated at approximately US$ 1.16 trillion
- About 30% of cancers are **attributable to behavior risk factors.**

Estimated age-standardised incidence and mortality rates: total population
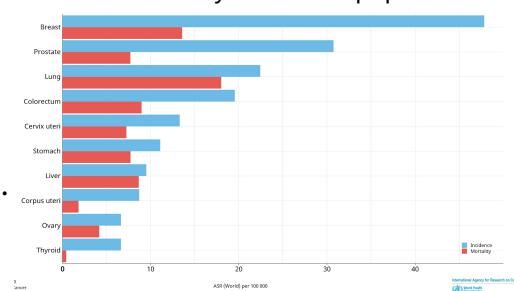
1   Cervical Cancer

Cancer of the female reproductive system.

- The cervix is made up of two cell types (squamous and glandular).
- Cervical cancer tends to occur where the two cell types meet.
- 99% of cases linked to genital infection with **(HPV)**. we have vaccine for it

Estimated age-standardized incidence and mortality rates (World) in 2020, cervix uteri, ages 0-74

Risk Factors:

1. Human Papillomavirus (HPV) [1]
2. Smoking
3. Immunodeficiency Disorders (e.g. HIV)
4. Poverty
5. No access to PAP screening
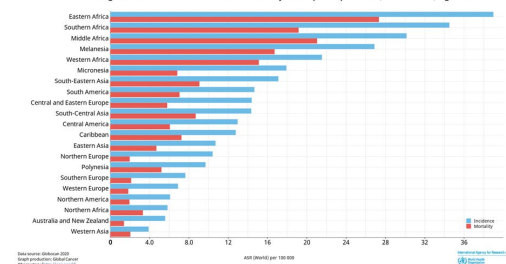6. Family history of cervical cancer

2   Breast Cancer [2]

- Cancer that forms in the tissues of the breast.
- Usually affects the ducts or the lobules.
- Occurs commonly in women, rarely occurs in men.
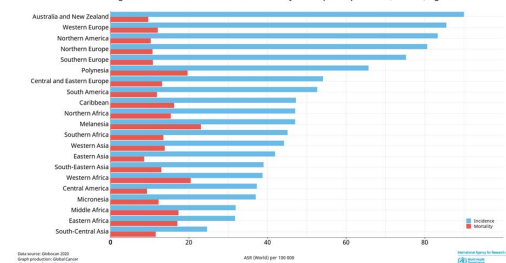- 1 of 8 women will be diagnosed with breast cancer in her lifetime.

Estimated age-standardized incidence and mortality rates (World) in 2020, breast, ages 0-74

Risk Factors:

1. Hormonal therapy
2. Weight and physical activity [3]
3. Race
4. Age is the most reliable risk factor
   - Screening should start after 45 [4].
5. Genetics (e.g. BRCA1, BRCA2)

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1. There's a vaccine for this virus that decreased the incidence of cervical cancer
2. Incidence higher in European countries however the mortality is considerably lower compared to African countries
3. Estrogen is formed in the ovaries and in adipose tissue. Obesity can increase the aromatization of androgens and increase the levels of estrogen leading to an increased risk for breast cancer
4. Women with positive family history should start screening prior to this age

Cancer

3   ## Lung Cancer

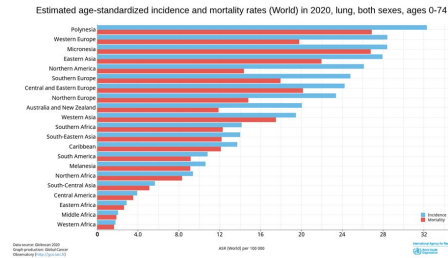Estimated age-standardized incidence and mortality rates (World) in 2020, lung, both sexes, ages 0-74

- Cancer forms in tissues of the lung, usually in the cells lining air passages.
- Leading cause of cancer death globally, 1.37 million deaths in 2008.
- Affects more men than women.
- Two main types: [1] 1- small cell cancer [2] 'more aggressive' 2- non-small cell cancer.

Risk Factors: ⭐

1. **Smoking** cigarettes, pipes, or cigars now or in the past.
2. Being exposed to secondhand smoke
3. Being exposed to asbestos, radon, chromium, nickel, arsenic, soot, or tar.
4. Being treated with radiation therapy
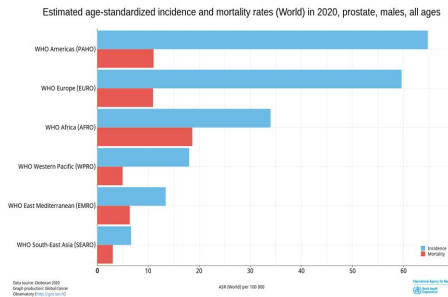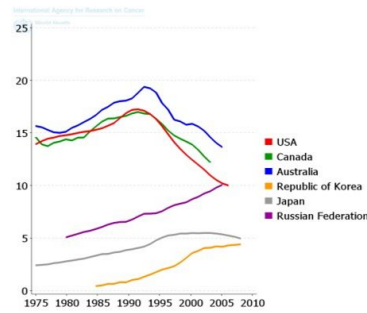   - To the breast or chest
5. Living where there is air pollution.

4   ## Prostate Cancer

- 2nd most common cancer among men
- The cancer develops inside of the prostate.

Estimated age-standardized incidence and mortality rates (World) in 2020, prostate, males, all ages

Risk Factors:

1. Age
2. Weight gain
3. Obesity
4. Race

5   ## Colorectal Cancer

Estimated age-standardized incidence and mortality rates (World) in 2020, Colorectum, both sexes, all ages
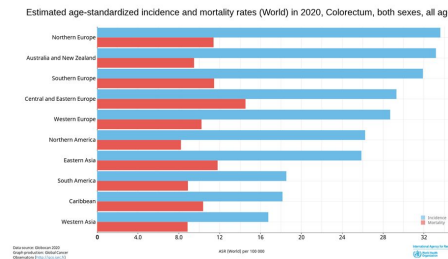
- 3rd most common type of cancer (most common in men in KSA)
- Forms in the lower part of the digestive system (large intestine)
- Most preventable cancer among men in KSA
- Most common death cause of cancer among men in KSA

Risk Factors:

1. Age
2. Unhealthy diet and low exercise
3. Black Race
4. Diabetes
5. Family history of colorectal cancer

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1. It is important to differentiate between the 2 types because the two have different management options; SCC can not be treated by surgery
2. Mainly is caused by tobacco smoking.

Chronic Respiratory Disease

Definition:

- Chronic respiratory diseases (CRDs) are diseases of the airways and other structures of the lung. Some of the most common are chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases and pulmonary hypertension.

Global Burden:

- A leading cause of death
- High underdiagnoses rates
- 90% of deaths occur in low-income countries

Risk Factors

1. **Cigarette smoke**
2. Occupational dust and chemicals
3. Environmental Tobacco Smoke (ETS)
4. Indoor and outdoor air pollution
5. Genes
6. Infections (frequent respiratory infections)
7. Socio-economic status
8. Aging populations

Why Risk Factors?

- Surveillance for non-communicable disease can be difficult because of:
  - Lag time between exposure and health condition (e.g. smoking and COPD)
  - More than one exposure for a health condition
  - Exposure linked to more than one health condition
- Interventions that target risk factors are needed to prevent disease.
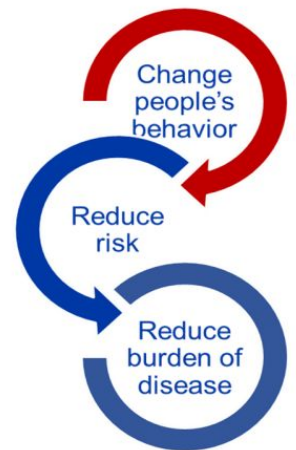
## 19 Leading Risk Factors Causing Death:
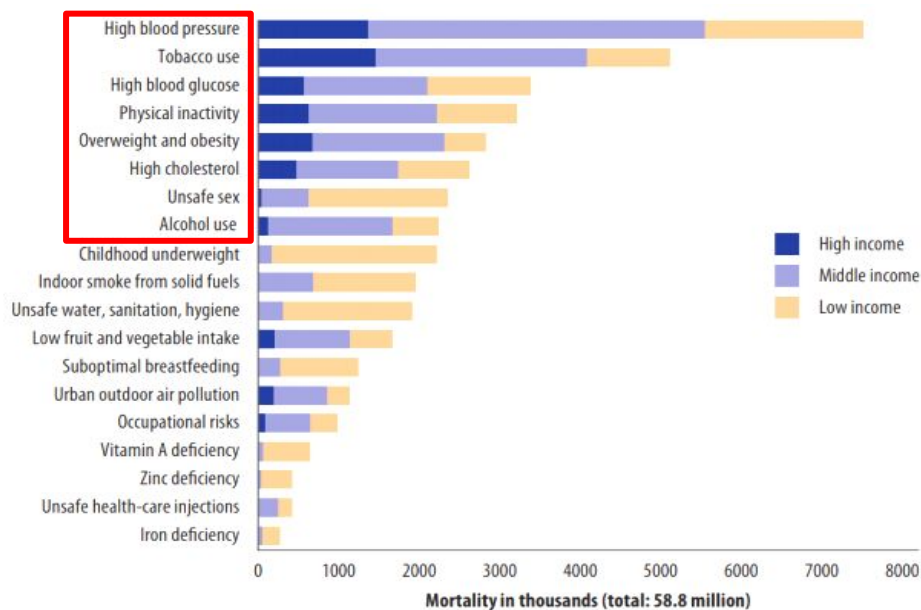
Leading Risk Factors Causing Death

Tobacco Use

Global Tobacco Survey

- Tobacco kills up to half of its users.
- Tobacco kills nearly 8 million people each year.
- More than 7 million deaths are the result of direct tobacco use
- Around 1.2 million are the result of non-smokers being exposed to secondhand smoke.
- Nearly 80% of the world's 1.3 billion smokers live in low- and middle-income countrie
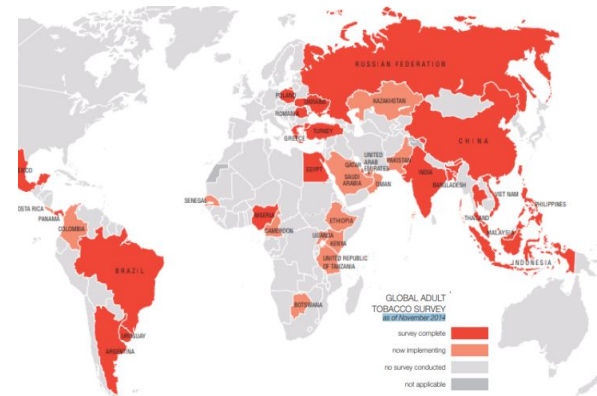
▶ Health Effects:

Among Smokers:

- Cancer
- Coronary heart disease
- Diseases of the lungs
- Peripheral vascular disease
- Stroke
- Fetal complications and stillbirth

Among Second-hand Smokers:

- Heart disease
- E.g. Heart attack
- Lung cancer
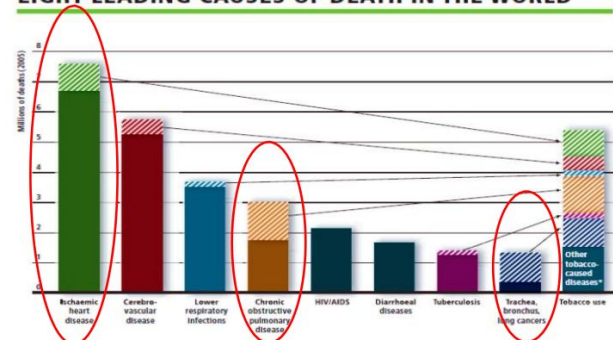
Unhealthy Diet

- Most countries have increased overall daily consumption of:
- Daily calories
- Fat and meats
- Energy dense and nutrient-poor foods such as: starches, refined sugars, trans-fats.

▶ Health Effects:

- Coronary Heart Disease (CHD)
- Stroke
- Cancer
- Type 2 diabetes (T2D)
- Hypertension
- Diseases of the liver and gallbladder
- Obesity

Leading Risk Factors Causing Death

Physical Inactivity

- 31% of the world's population does not get enough physical activity.
- Many social and economic changes contribute to this trend. [1]
- Example: Aging populations, transportation, and Communication technology.
- 6-10% of major NCDs worldwide is attributable to physical inactivity.

6%
CHD

7%
T2D

10%
Breast
cancer

10%
Colon
cancer

9%
Premature
Mortality

Health Effects:

Reduces:

- High blood pressure
- Improves lipid profile
- Arthritis pain
- Psychiatric issues

Reduces risk of:

- T2D
- Certain cancers
- Heart attacks and strokes
- Early death and falls

Alcohol Use

- 11.5% of all global drinkers are episodic, heavy users.
- 2.5 million people die from alcohol consumption per year
- The majority of adults consume at low-risk levels.
- Estimated worldwide consumption of alcohol has remained relatively stable.

Excessive Drinking: [2]

Heavy Drinking on average:

Binge drinking (single occasion):

Figure 3.3 Total alcohol per capita consumption (APC) (15+ years; in litres of pure alcohol), 2016

Health Effects:

Immediate effects

- Diminished brain function
- Loss of body heat
- Fetal damage
- Risk of unintentional injuries and violence
- Coma and death

Long term effects

- Liver disease
- Cancers
- Hypertension
- GI disorders
- Neurological and psychiatric issues
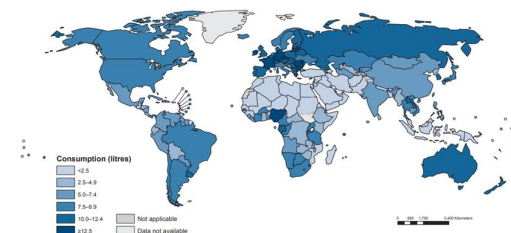
1. Cars, TVs, mobile phones and many other new technologies contributed to the decrease in physical activity
2. Women have generally less body surface area and have a lower enzymatic activity responsible in detoxifying alcohol, thus they can get intoxicated by less amount when compared to men.

Metabolic **Risk Factors**

01	02	03	04
Raised blood pressure	Raised cholesterol	Raised blood glucose	Overweight and Obesity

1 ➤ **Raised Blood Pressure:**
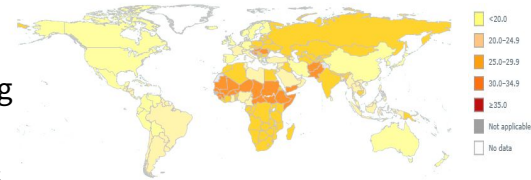

- Blood Pressure is measured as systolic/diastolic and expressed in mmHg
  - Systolic = amount of force your arteries use when the heart pumps
  - Diastolic = amount of force your arteries use when the heart relaxes

Measurement	Normal	Prehypertensive	Hypertensive
Systolic (mmHg)	<120	120-139	140+
Diastolic (mmHg)	<80	80-89	90+

Health Effects:

- Leading risk factor for **stroke** and **coronary heart disease (CHD)**.
- In some age groups, the risk of CVD doubles for each increment of 20/10 mmHg of blood pressure.
- Other complications of raised blood pressure:
  - Heart failure
  - Peripheral vascular disease
  - Renal impairment
  - Retinal hemorrhage
  - Visual impairment

Hypertension and Excessive Sodium Intake:

- Sodium (through HTN) is a major cause of CVD deaths and disability.
- About 10% of CVD is caused by excessive sodium intake.
- 8.5 million deaths could be prevented over 10 years if sodium intake were reduced by 15%.
- People are unaware of how much dietary sodium they are eating.
- In the U.S. 75% of sodium consumed comes from **processed and restaurant foods.**
- In China and Japan, 75% of sodium consumed comes from cooking with **high sodium products**.

Recommendations and Actual Intakes WHO/PAHO:

- A population salt intake of less than **5 grams or approximately 2,000 milligrams of sodium**, per person per day is recommended to reach national targets or in their absence. This level was recommended for the prevention of cardiovascular diseases.
- Actual intake: Latest global estimates show that average sodium intake varies from 2,000 to 7,200 milligrams of sodium per person per day

Metabolic Risk Factors

2 ❯ **Raised Blood Cholesterol:**

> ## Raised total cholesterol

HDL: High density lipoproteins; often called "**Good cholesterol**"	**LDL**: Low density Lipoproteins; often called "**Bad cholesterol**"
VLDL: Very low density Lipoproteins; has highest amount of triglycerides.	**Triglycerides**: Type of fat found in your blood (stored in fat cells)
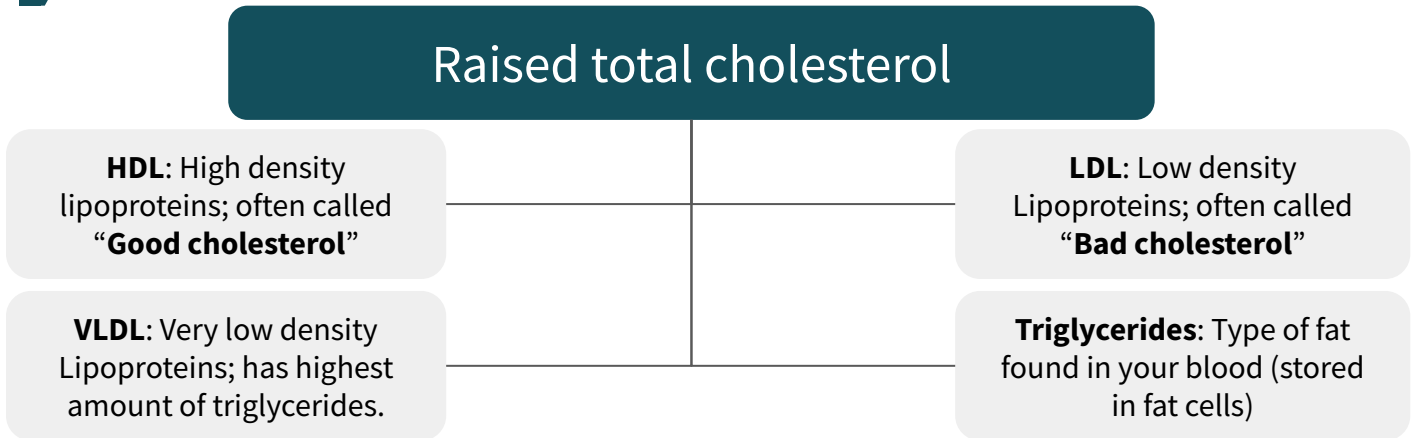
Global Burden

- In 2008, global prevalence of raised total cholesterol among adults (≥ 5.0 mmol/l) was 39% (37% for males and 40% for females).
- Estimated to cause 2.6 million deaths.

Health Effects

- **Increases risks of heart disease and stroke**
    - Globally, ⅓ of ischaemic heart disease is attributable to high cholesterol.
    - A 10% reduction in serum cholesterol in men aged 40 has been reported to result in a 50% reduction in heart disease within 5 years.
    - A 10% reduction in serum cholesterol in men aged 70 years can result in an average 20% reduction in heart disease occurrence in the next 5 years

3 ❯ **Raised Blood Glucose:**

- Sugar produces fuel and energy for our cells
- Insulin helps control the amount of glucose in our bodies

Global Burden:

- In 2012, it was estimated that elevated glucose resulted in 3.7 million deaths.
- Globally, approximately 8.3% of adults aged 18 and over had elevated blood glucose in 2013.

Health Effects

- Elevated glucose levels can lead to type 2 diabetes.
- Diabetes is the leading cause of renal failure.
- Lower limb amputations are at least 10 times more common in people with diabetes
- Raised glucose is a major cause of heart disease and renal disease.
- Retinal damage

Metabolic Risk Factors

4 > Overweight and Obesity:

- Overweight and obesity are defined as
  "abnormal or excessive fat accumulation that presents a risk to health."

Body Mass Index	
BMI (Body Mass Index) = Weight (kg) / Height^2 (m)	
Underweight	<18.5
Normal	18.5-24.9
Overweight	25-29.9
Obese	>30
Skinfold Thickness Test	
Waist-to-Hip Circumference Ratio	
Men	> 102 cm are considered high risk
Women	> 88 cm are considered high risk

★ NCDs in Saudi Arabia:

NCDs risk factors in Saudi Arabia:

PROPORTIONAL MORTALITY*

▶ **37%**
Cardiovascular diseases

▶ **20%**
Other NCDs

▶ **10%**
Cancers

▶ **11%**
Communicable, maternal, perinatal and nutritional conditions

▶ **3%**
Chronic respiratory diseases

▶ **16%**
Injuries

▶ **3%**
Diabetes

NCDs are estimated to account for **73%** of all deaths.

|	DATA YEAR	MALES	FEMALES	TOTAL
Total NCD deaths	2016	48 600	34 500	83 100
Risk of premature death between 30-70 years (%)	2016	18	14	16
Suicide mortality rate (per 100 000 population)	2016	-	-	3
Total alcohol per capita consumption, adults aged 15+ (litres of pure alcohol)	2016	0	0	0
Physical inactivity, adults aged 18+ (%)	2016	44	64	52
Mean population salt intake, adults aged 20+ (g/day)	2010	8	8	8
Current tobacco smoking, adults aged 15+ (%)	2016	26	2	16
Raised blood pressure, adults aged 18+ (%)	2015	21	16	19
Raised blood glucose, adults aged 18+ (%)	2014	15	14	14
Obesity, adults aged 18+ (%)	2016	31	41	35
Obesity, adolescents aged 10-19 (%)	2016	19	14	17
Exceedance of WHO guidelines level for annual PM2.5 concentration (proportion)	2016	-	-	8
Population with primary reliance on polluting fuels and technologies (%)	2016	-	-	<5

WHO Website

Global Health Observatory (GHO):

- Provides data and analyses on global health priorities
- Noncommunicable diseases
  - Mortality/morbidity
  - Risk Factors
- Country statistics: health data and statistics for countries

Media Centre Fact Sheets:

- Key facts
- Symptoms, risk factors and burden of disease
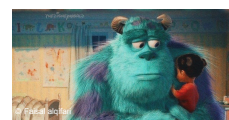
This slide is important to you

Quiz

MCQ

1- Which of the following modifiable risk factors is considered a shared risk factor between Cardiovascular Disease (CVD) and Chronic Respiratory Disease (CRD)?

A- Physical Inactivity
B- Genetic predisposition
C- Unhealthy diet
D- Tobacco use

2- Which of the following cancer sites is considered the most common one in Saudi Arabia?

A- Males: Colorectal cancer ;   Females: Breast cancer
B- Males: Prostate cancer   ;   Females: Breast cancer
C- Males: Prostate cancer   ;   Females: Thyroid cancer
D- Males: Thyroid cancer   ;   Females: Colorectal cancer

3- A patient was asked you about the relation between sodium and blood pressure. After explaining to him the relationship between them. He asked you about the recommended intake of sodium:

A- 5 g of sodium
B- 3 g of sodium
C- 2 g of sodium
D- 4 g of sodium

4- Which of the following is considered a preventative measure for NCDs?

A- Performing a bypass graft for a patient with coronary stenosis
B- Genetic testing
C- Vaccinating against HPV.
D- Promoting physical inactivity

4- According to latest guidelines on Obesity, which of the following waist-to hip ratios are associated with increased risk in women.

A- > 108 cm
B- > 102 cm
C- > 92 cm
D- > 88 cm

Answers

Q1	Q2	Q3	Q4	Q5
D	A	A	C	D

Thank You and Good Luck

Community Medicine 438

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Wish you all the best!