Risk factors for NCDs

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The slides have been adopted from WHO website on NCDs

Objectives of the session

- Define selected risk factors such as; tobacco use, diet, nutrition, physical activity, obesity, ad overweight
- Present the epidemiology and significance of the risk factors globally and in KSA
- Discuss high risk populations and consequences of the NCD risk factors
- Enlist screening methods for these risk factors
- Discuss examples of evidence based interventions to prevent and control these risk factors

Types of NCDs

- Cardiovascular disease (e.g., Coronary heart disease, Stroke)
- Cancer
- Chronic respiratory disease
- Diabetes
- Chronic neurologic disorders (e.g., Alzheimer's, dementias)
- Arthritis/Musculoskeletal diseases
- Unintentional injuries (e.g., from traffic crashes)

http://www.who.int/gho/ncd/mortality_morbidity/en/index.html

Risk Factor: Definition

"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."

Principles of Epidemiology, CDC, 2006

Modifiable Risk Factor

- A behavioral risk factor that **can** be reduced or controlled by intervention, thereby reducing the probability of disease.
- WHO has prioritized the following four:
  - Physical inactivity,
  - Tobacco use,
  - Alcohol use, and
  - Unhealthy diets (increased fat and sodium, with low fruit and vegetable intake).

http://www.who.int/nmh/events/2012/discussion_paper3.pdf

Non-Modifiable Risk Factor

A risk factor that cannot be reduced or controlled by intervention; for example:

- Age,
- Gender,
- Race, and
- Family history (genetics).

Common Risk Factors

Noncommunicable Diseases

4 Diseases, 4 Modifiable Shared Risk Factors

	Tobacco Use	Unhealthy diets	Physical Inactivity	Harmful Use of Alcohol
Cardio-vascular	✓	✓	✓	✓
Diabetes	✓	✓	✓	✓
Cancer	✓	✓	✓	✓
Chronic Respiratory	✓			

Noncommunicable Diseases
World Health Organization
ECOSOC High-level Segment

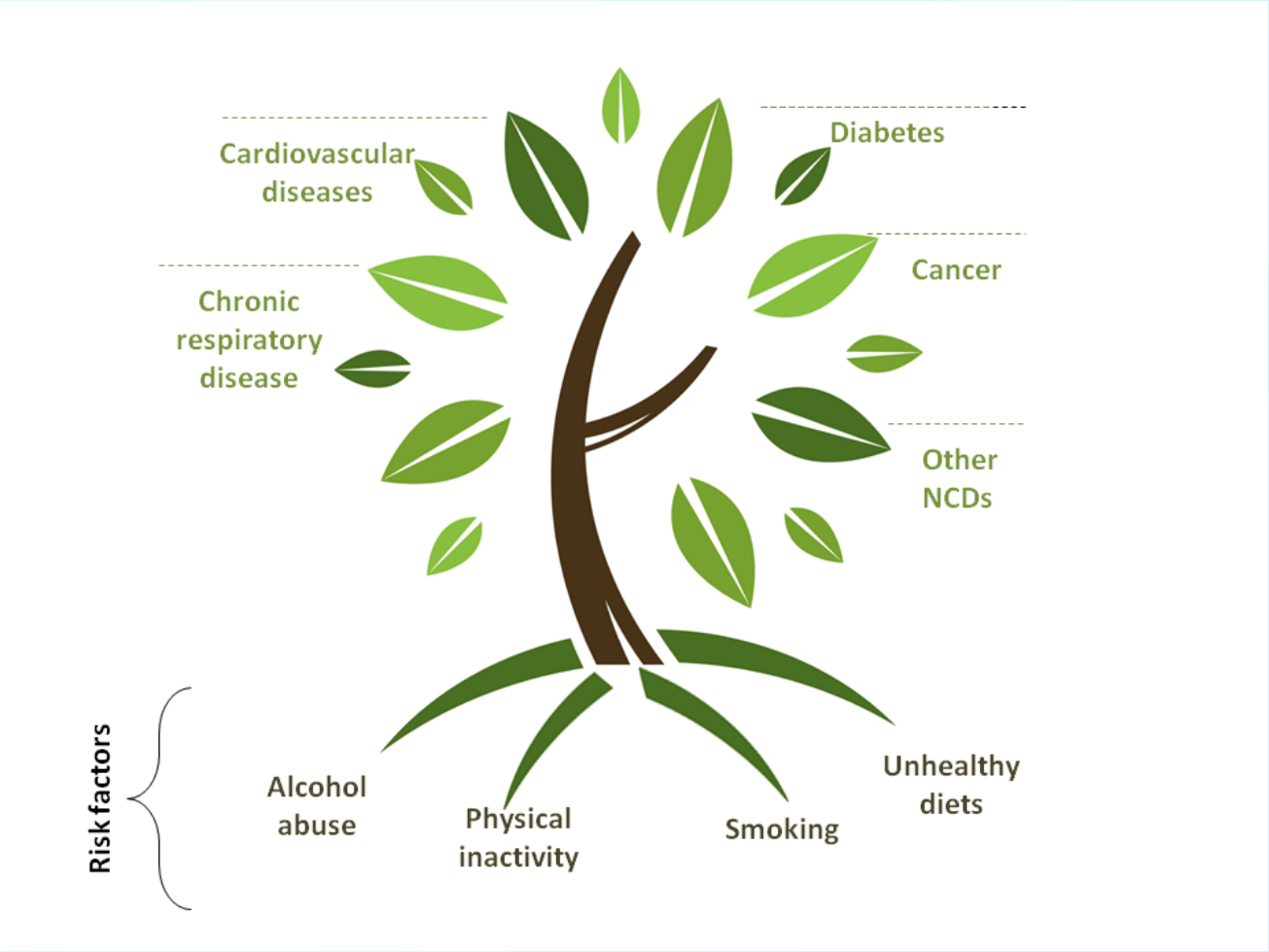
World Health Organization

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:
  - Raised blood pressure
  - Raised total cholesterol
  - Elevated glucose
  - Overweight and obesity

http://www.who.int/nmh/events/2012/discussion_paper3.pdf

FOUR LEADING NCDs



WHO Website

Global Health Observatory (GHO): **http://www.who.int/gho/en/**

- 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:
http://www.who.int/mediacentre/factsheets/en/

- Key facts
- Symptoms
- Risk factors
- Burden of disease

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
Cerebrovascular disease (Stroke)	Disease of the blood vessels supplying the brain
Peripheral arterial disease	Disease of blood vessels supplying the arms and legs
Congenital heart disease	Malformations of heart structure existing at birth

Global Burden of Cardiovascular Disease

- CVDs are the #1 cause of death globally.
- An estimated 17.3 million people died from CVDs in 2008. (30% of all global deaths)
  - 7.3 million were due to coronary heart disease
  - 6.2 million were due to stroke
- Over 80% CVD deaths occur in low- and middle- income countries.
- By 2030, almost 25 million people will die from CVDs.

http://www.who.int/cardiovascular_diseases/en/

Cardiovascular Disease: Risk Factors

Major modifiable risk factors -High blood pressure -Abnormal blood lipids -Tobacco use -Physical inactivity -Obesity -Unhealthy diet (salt) -Diabetes	***Other modifiable risk factors*** -Low socioeconomic status -Mental ill health (depression) -Psychosocial stress -Heavy alcohol use -Use of certain medication -Lipoprotein(a)
Non-modifiable risk factors -Age -Heredity or family history -Gender -Ethnicity or race	***"Novel" risk factors*** -Excess homocysteine in blood -Inflammatory markers (C-reactive protein) -Abnormal blood coagulation (elevated blood levels of fibrinogen)

Diabetes: Definition

- Diabetes is a disorder of metabolism— the way the body uses digested food for growth and energy.
- There are 4 types: Type 1, Type 2, Gestational, and Pre-Diabetes (Impaired Glucose Tolerance).
- Type 2 is caused by modifiable risk factors and is the most common worldwide.
  - >90% of all adult diabetes cases are Type 2

1. http://www.who.int/mediacentre/factsheets/fs312/en/
2. National institute of Diabetes and Digestive and Kidney Diseases, 2012

Diabetes: Burden of Disease

- 347 million people worldwide have diabetes.
- In 2004, an estimated 3.4 million people died from consequences of high blood sugar.
- More than 80% of diabetes deaths occur in low- and middle-income countries.
- WHO projects that diabetes deaths will increase by two thirds between 2008 and 2030.
- Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use can prevent or delay the onset of type 2 diabetes.

1. http://www.who.int/mediacentre/factsheets/en/
2.http://www.idf.org/regions

Diabetes: Risk Factors

Major modifiable Risk Factors -Unhealthy diets -Physical Inactivity -Obesity or Overweight -High Blood Pressure -High Cholesterol	***Other Modifiable Risk Factors*** -Low socioeconomic status -Heavy alcohol use -Psychological stress -High consumption of sugar-sweetened beverages -Low consumption of fiber
Non-modifiable Risk Factors -Increased age -Family history/genetics -Race -Distribution of fat	***Other Risk Factors*** -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)
- Benign tumors
- Malignant tumors

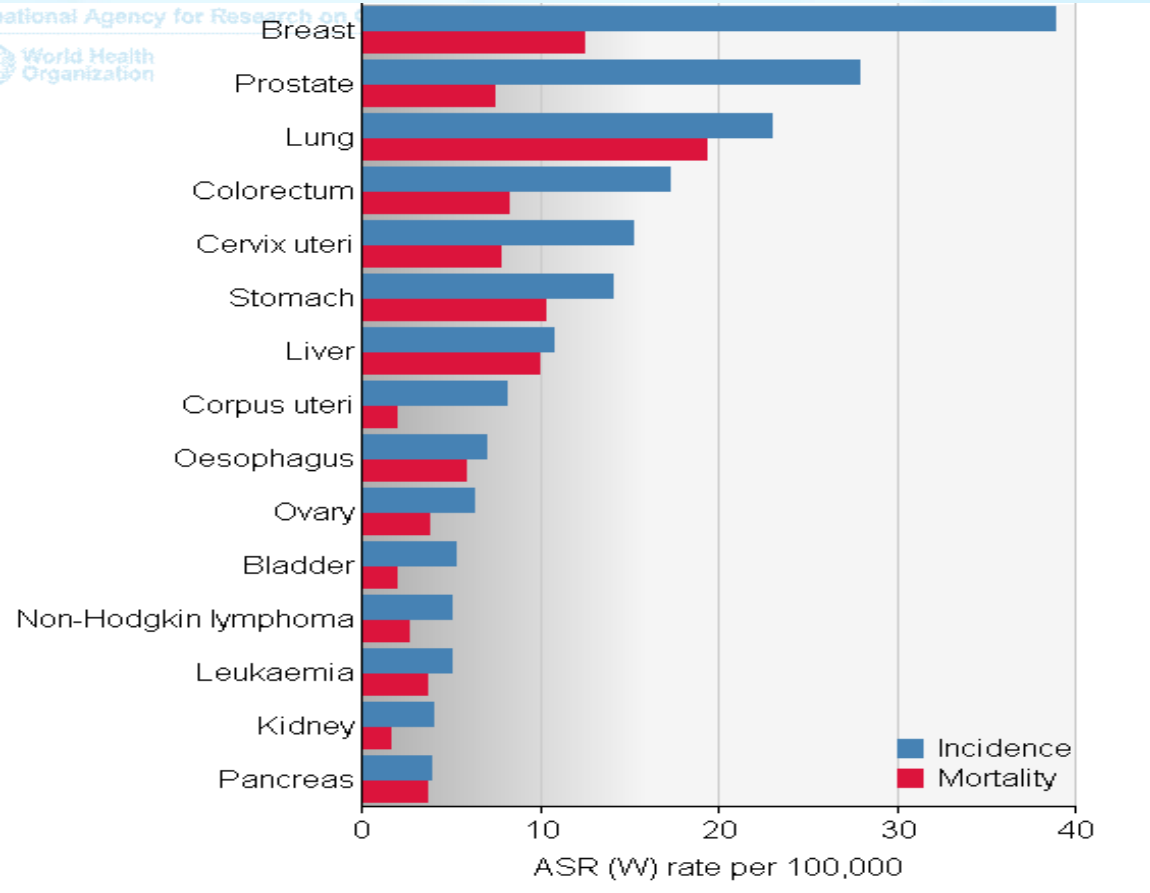
Global Burden of Cancer

- 7.6 million people died from cancer in 2008.
- 70% of all cancer deaths occur in low- and middle-income countries.
- Deaths from cancer are estimated to reach 13.1 million by 2030.
- About 30% of cancers are attributable to behavior risk factors.

http://www.who.int/mediacentre/factsheets/fs297/en/index.html

Cancer Epidemiology

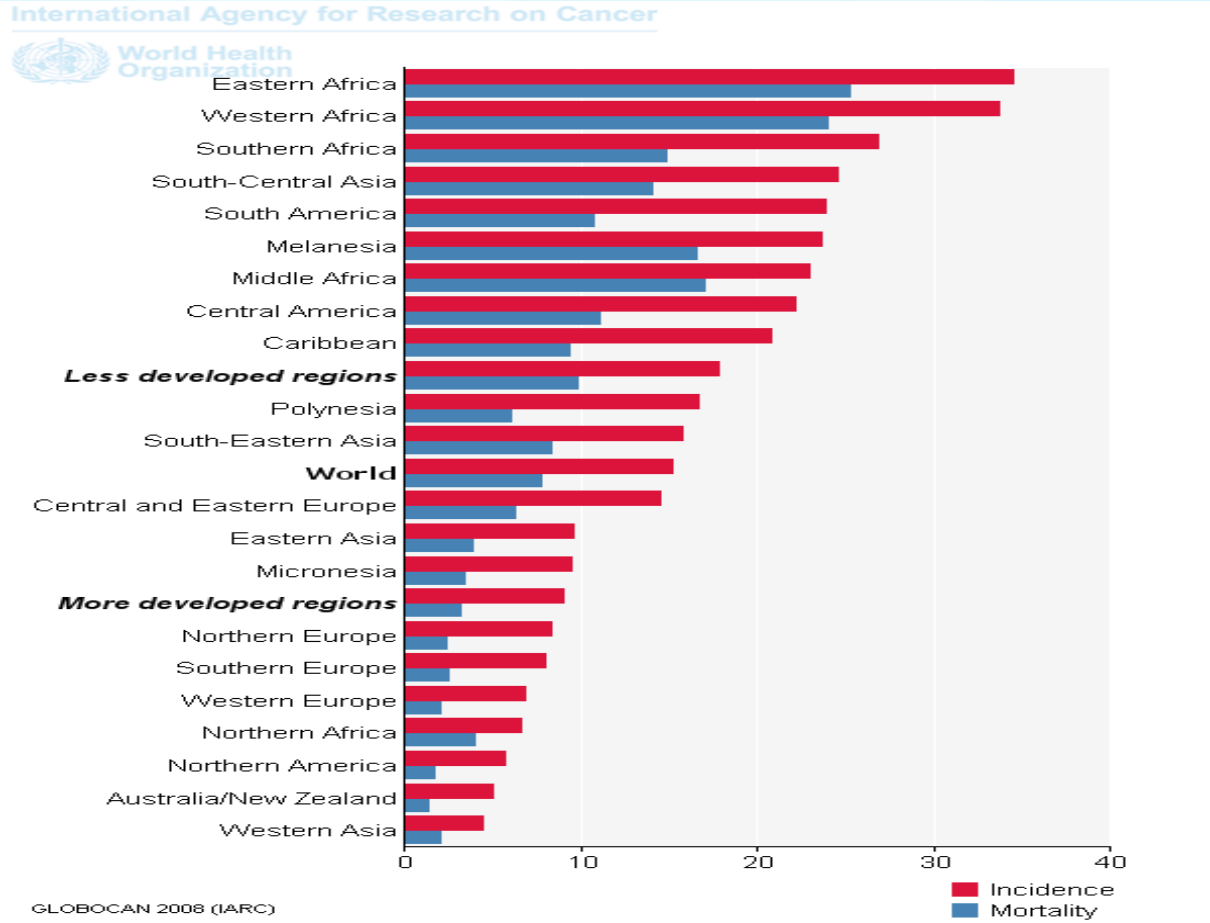
Estimated age-standardised incidence and mortality rates: total population



http://globocan.iarc.fr/

Cervical Cancer

Estimated age-standardised rates (World) per 100,000



http://globocan.iarc.fr/

Cervical Cancer: Risk Factors

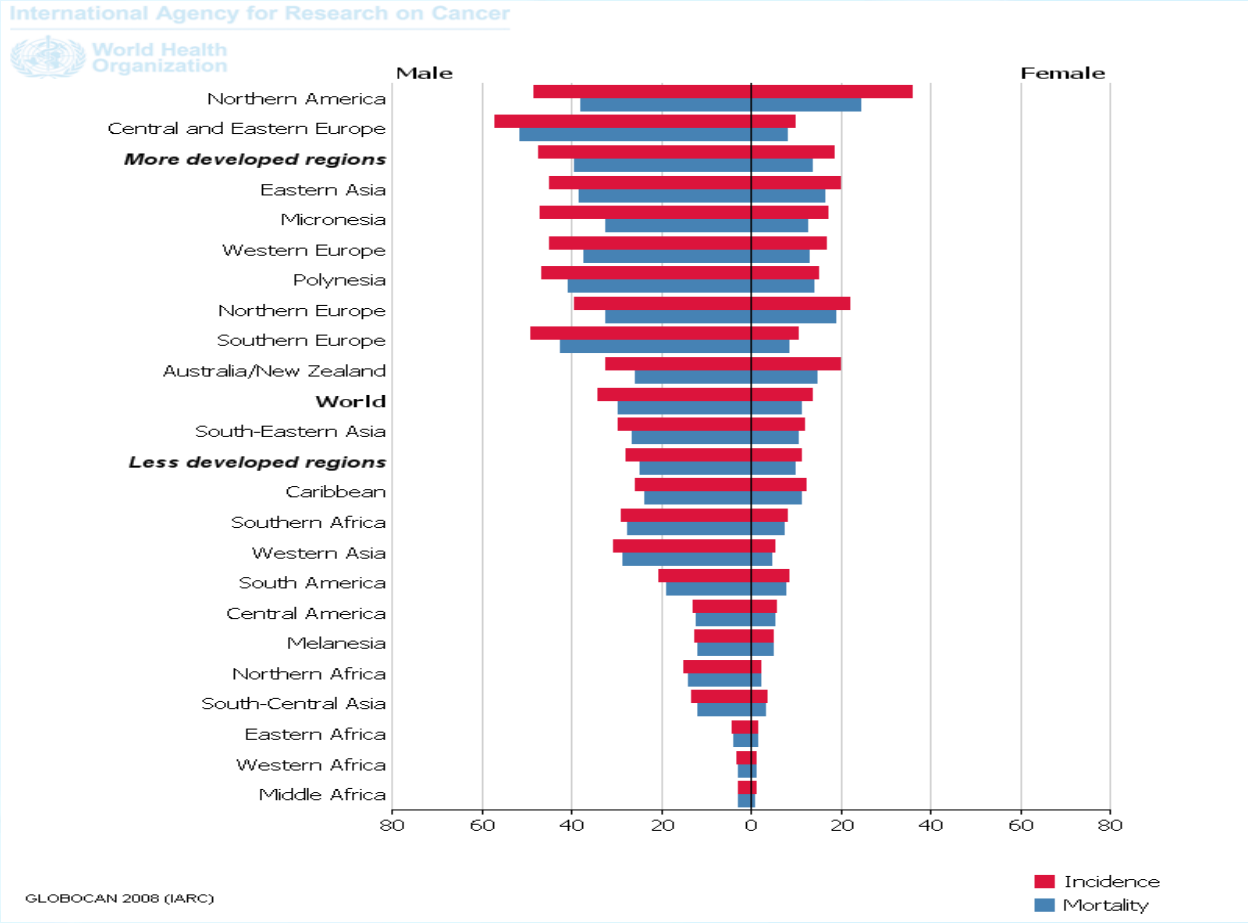
- Human papilloma virus infection (HPV)
- Smoking
- Immune Deficiencies
- Poverty
- No access to PAP screening
- Family history of cervical cancer

Lung Cancer: Definition

- Cancer that 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:
  - Small cell lung cancer
  - Non-small cell lung cancer

Lung Cancer

Incidence and Mortality in 2008: Both Sexes



Source: http://globocan.iarc.fr/

Lung Cancer: Risk Factors

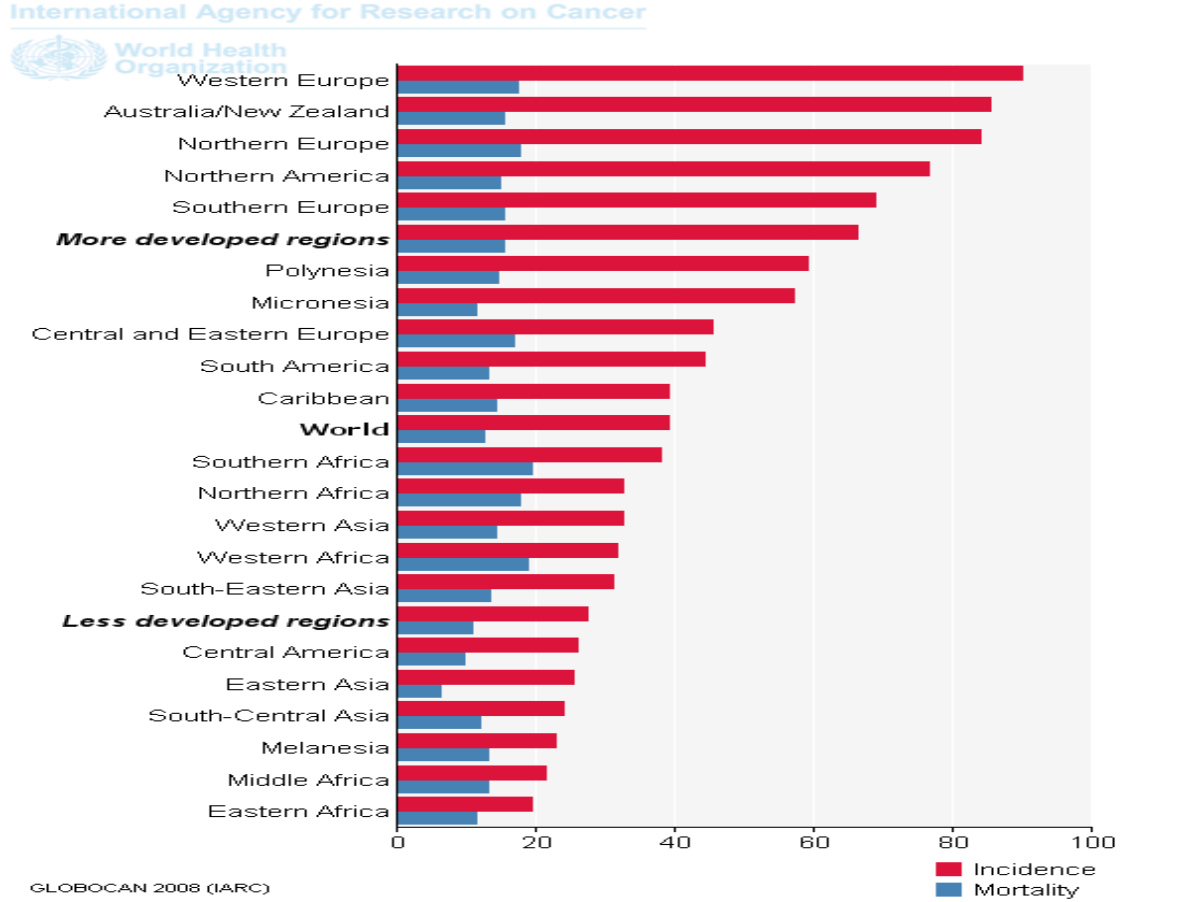
- Smoking cigarettes, pipes, or cigars - now or in the past
- Being exposed to second-hand smoke
- Being treated with radiation therapy to the breast or chest
- Being exposed to asbestos, radon, chromium, nickel, arsenic, soot, or tar
- Living where there is air pollution

Breast Cancer: Definition

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

Breast Cancer

Incidence and Mortality in 2008: Both Sexes



http://globocan.iarc.fr/

Breast Cancer: Risk Factors

- Hormone therapies
- Weight and physical activity
- Race
- Genetics or family history
  - BRCA1 and BRCA2 genes
- **Age** is the most reliable risk factor!
  - Risk increases with age

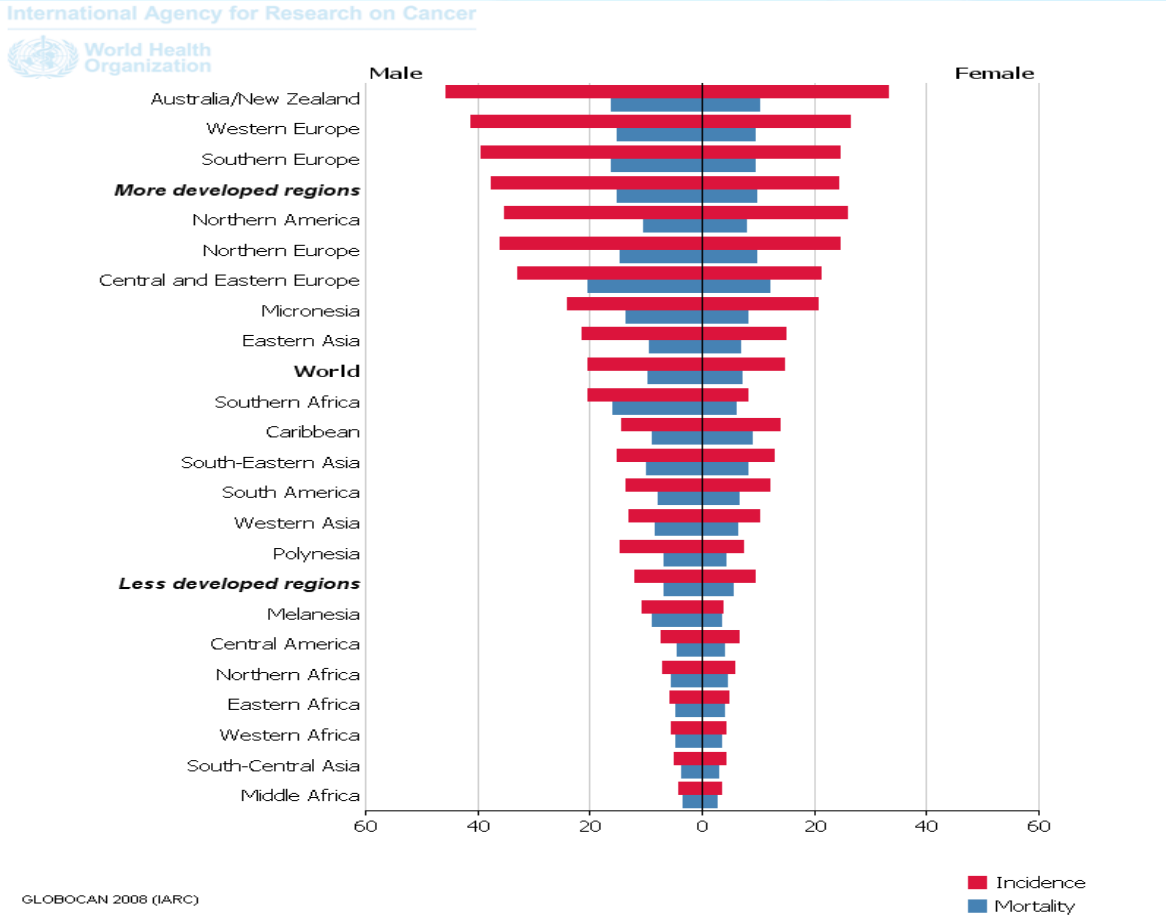
Colorectal Cancer

- 3rd most common type of cancer
- Forms in the lower part of the digestive system (large intestine)
- Risk Factors include:
  - Aging
  - Black race
  - Unhealthy diet and low exercise
  - Diabetes
  - Family history of colorectal cancer

http://www.mayoclinic.com/health/colon-cancer/DS00035

Colorectal Cancer

Incidence and Mortality in 2008: Both Sexes



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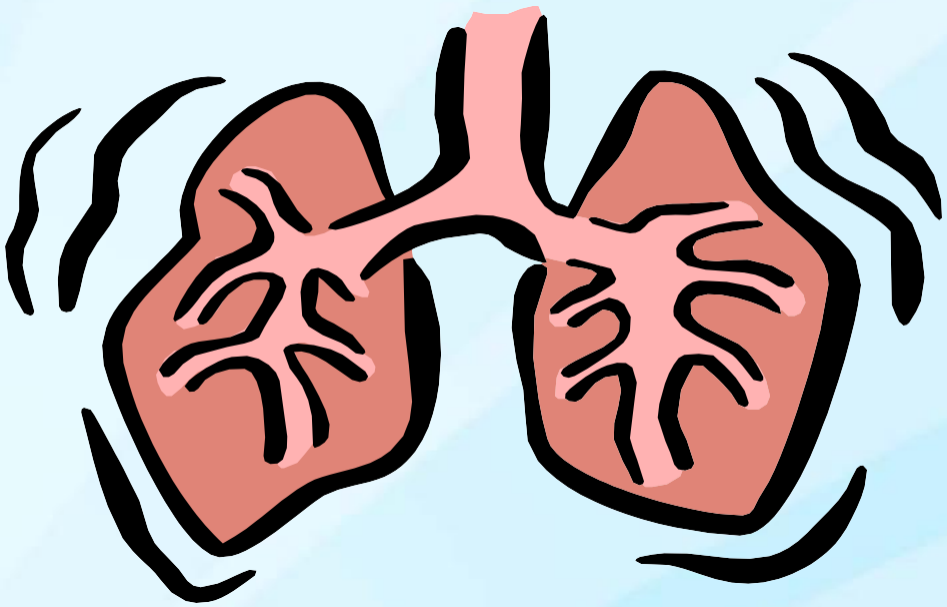


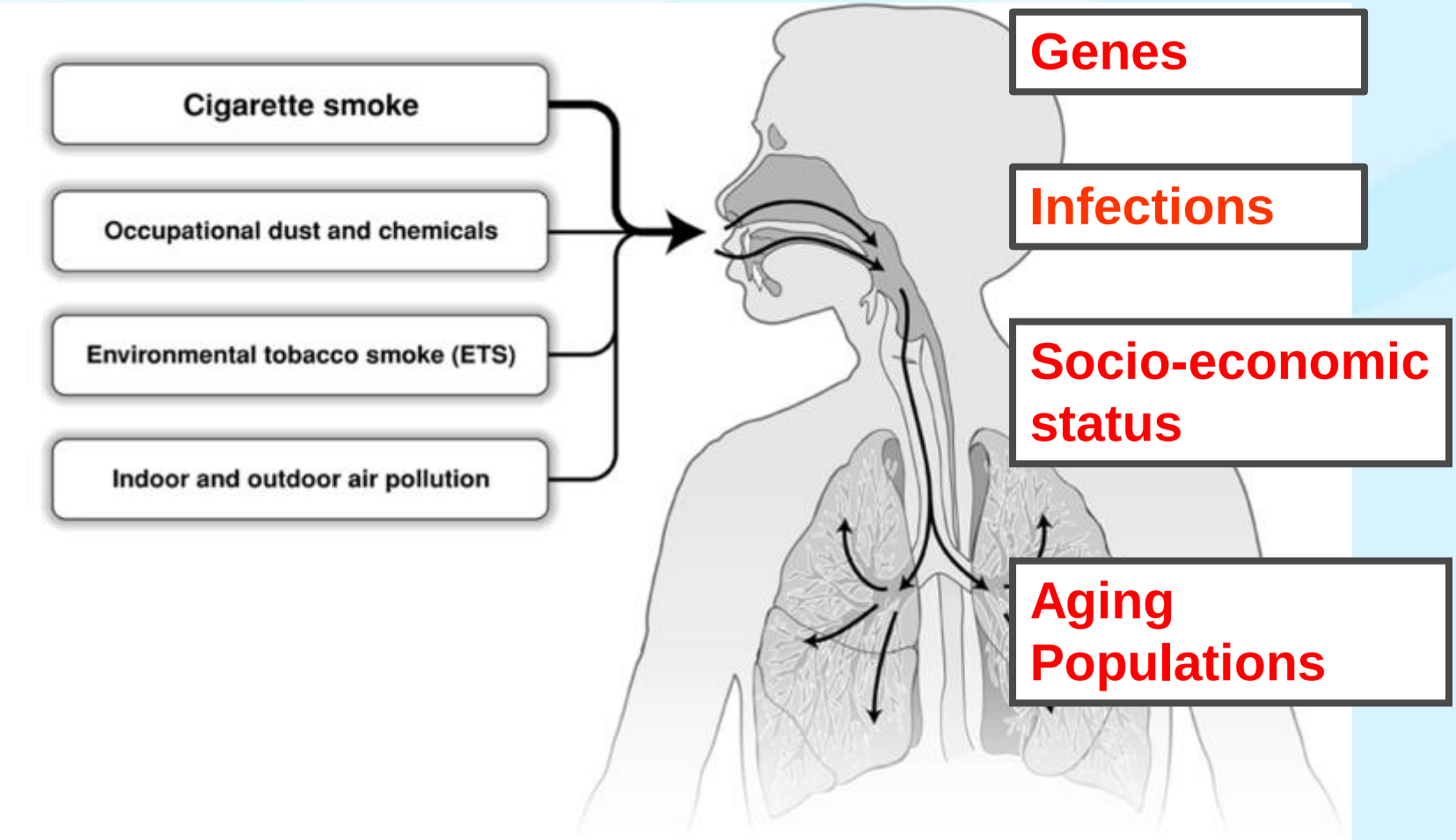
CHRONIC RESPIRATORY DISEASES

Global Burden of Chronic Respiratory Disease

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

http://www.who.int/respiratory/about_topic/en/index.html

Chronic Respiratory Diseases: Shared Risk Factors



http://www.goldcopd.org/other-resources-gold-teaching-slide-set.html

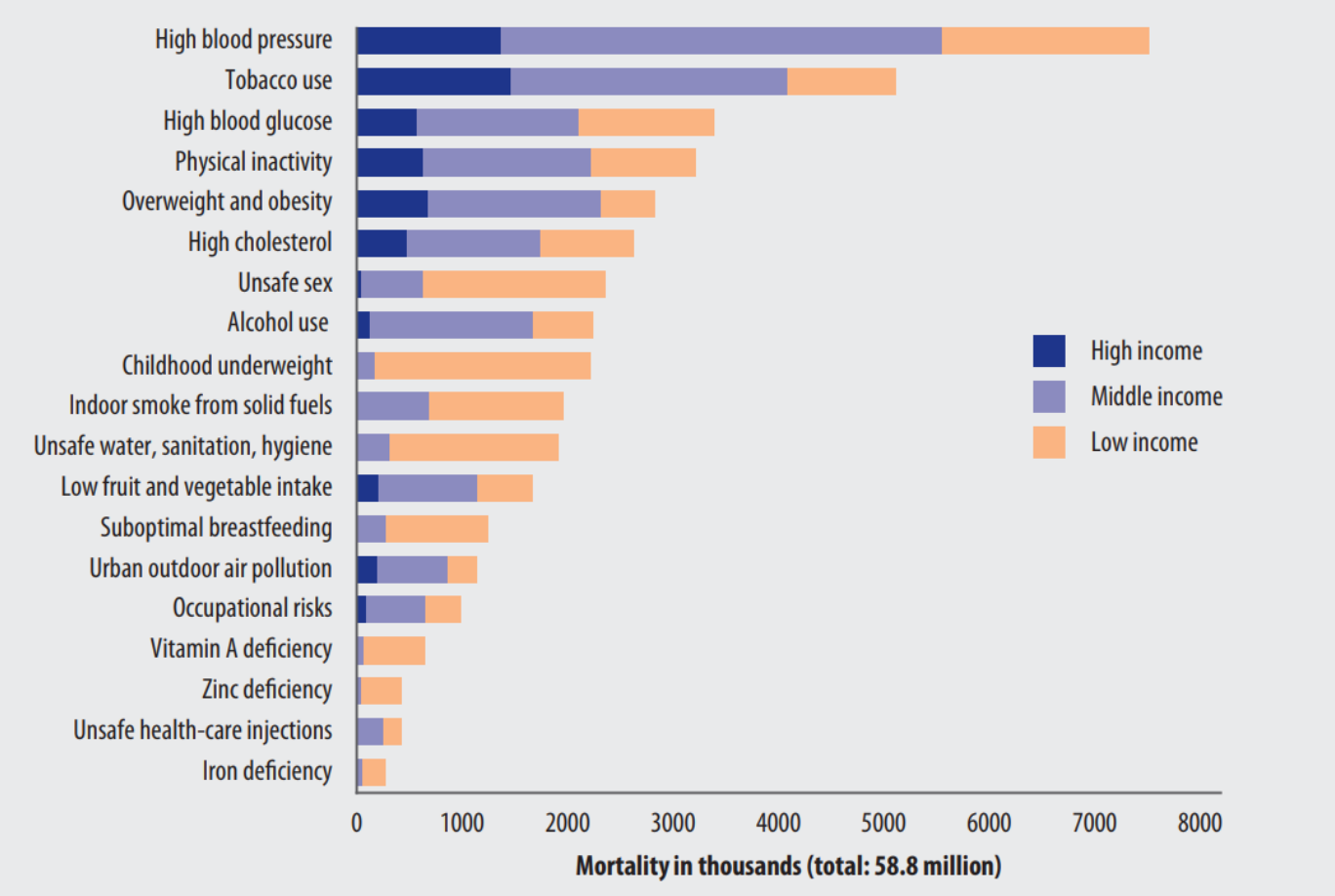
Why Risk Factors?

- Surveillance for non-communicable disease can be difficult because of:
  - Lag time between exposure and health condition,
  - More than one exposure for a health condition, and
  - Exposure linked to more than one health condition.

- Interventions that target risk factors are needed to prevent disease.

Risk Factor Surveillance

Deaths attributed to 19 leading risk factors, by country income level, 2004



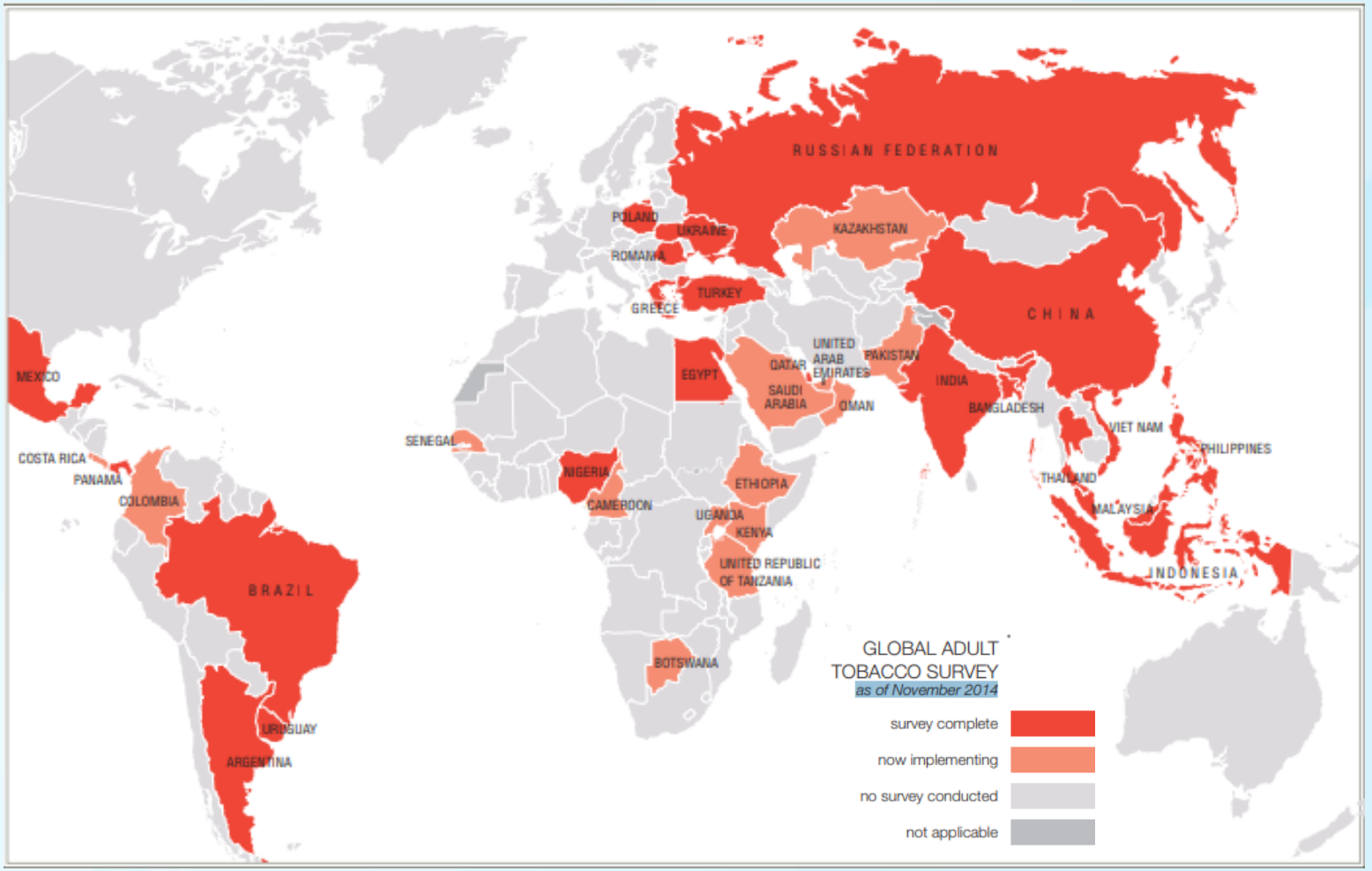
WHO Global Health risks report

Tobacco Use

- Tobacco kills up to half of its users.
- Tobacco kills nearly 6 million people each year.
- Annual death toll could rise to more than 8 million by 2030.
- Nearly 80% of the world's 1 billion smokers live in low- and middle-income countries.

http://www.who.int/mediacentre/factsheets/fs339/en/index.html

Global Adult Tobacco Survey



http://www.cdc.gov/tobacco/global/gtss/tobacco_atlas/index.htm

DIET

Global Changes in Diet

- Most countries have increased overall daily consumption of:
  - Daily calories,
  - Fat and meats, and
  - Energy dense and nutrient-poor foods such as:
    - Starches
    - Refined sugars
    - Trans-fats

http://www.pitt.edu/~super4/41011-42001/41171.pdf

Unhealthy Diet: Health Effects

- Coronary heart disease
- Stroke
- Cancer
- Type 2 diabetes
- Hypertension
- Diseases of the liver and gallbladder
- Obesity

PHYSICAL INACTIVITY

Global Changes in Physical Activity

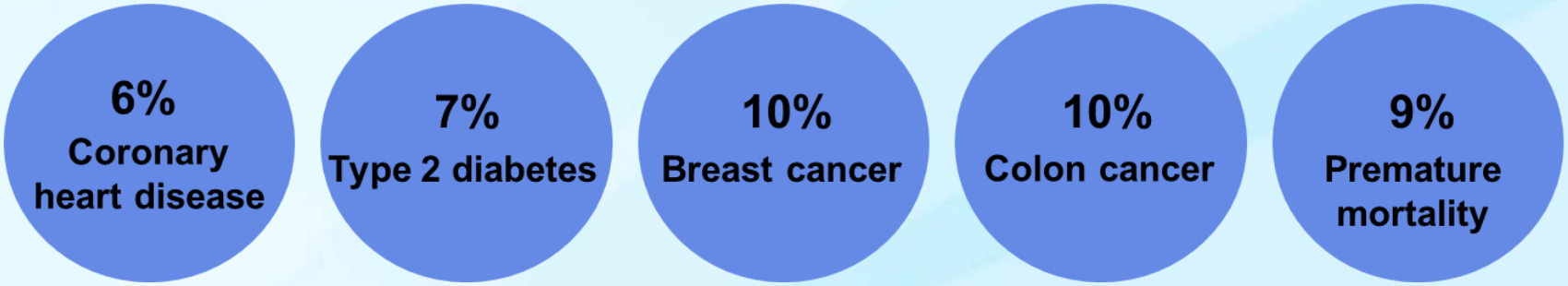
- 31% of the world's population does not get enough physical activity.

- Many social and economic changes contribute to this trend:
  - Aging populations,
  - Transportation, and
  - Communication technology.

1. http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html
2. http://www.sciencedirect.com/science/article/pii/S0140673612608988

Global Changes in Physical Activity *(cont.)*

~ 6-10% of major NCDs worldwide is attributable to physical inactivity



Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT; Lancet Physical Activity Series Working Group. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet. 2012 Jul 21;380(9838):219-29

Physical Activity: Health Effects

Reduces:

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

Reduces risk of:

- Type 2 diabetes
- Certain cancers
- Heart attacks
- Stroke
- Falls
- Early death

http://www.health.gov/paguidelines/factsheetprof.aspx

ALCOHOL USE

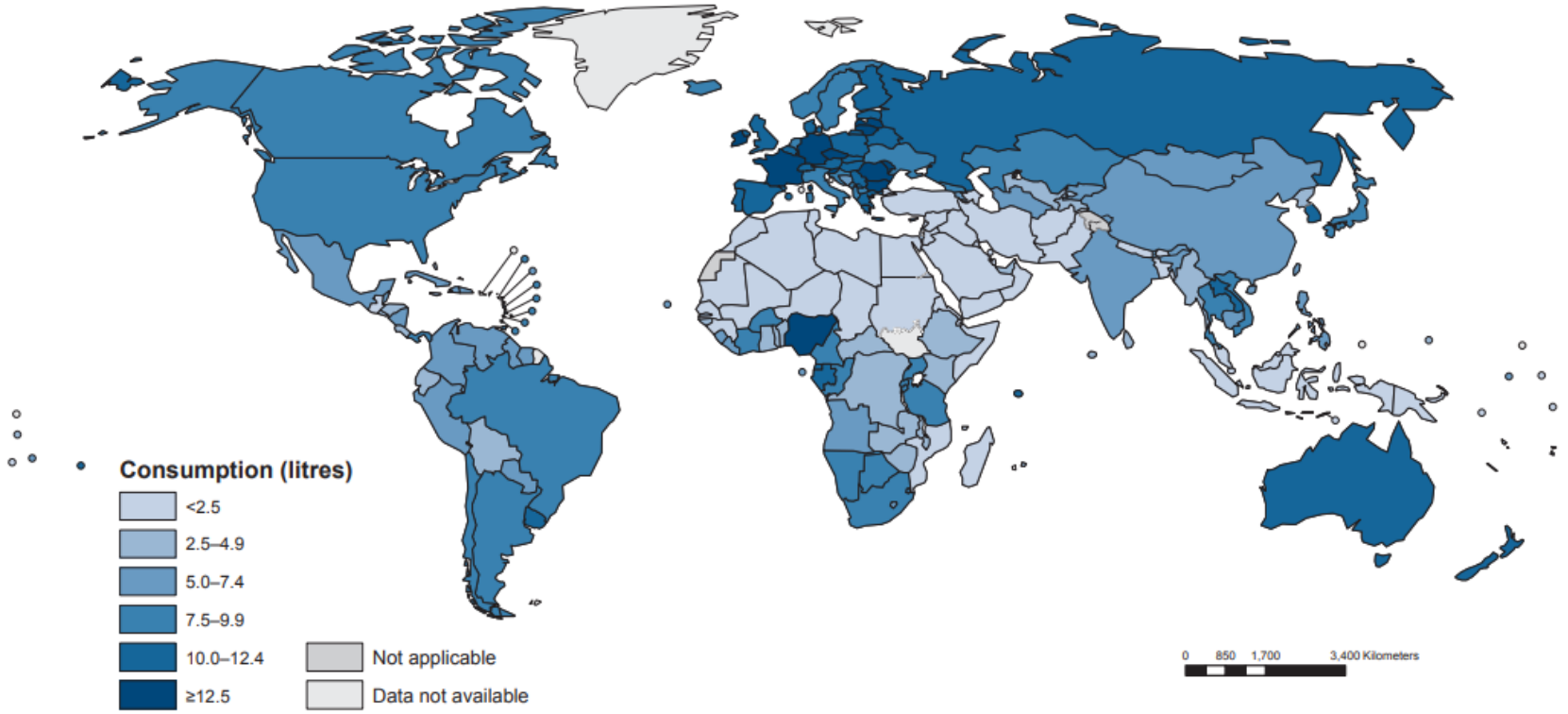
Global Alcohol Consumption

- 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.

http://www.who.int/substance_abuse/publications/global_alcohol_report/msbgsruprofiles.pdf

Global Alcohol Consumption

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



http://www.who.int/substance_abuse/publications/global_alcohol_report/en/index.html

Use of Alcohol: Definitions

Excessive drinking, per day

- Heavy drinking – on average

- Binge drinking – single occasion

Alcohol Use: Effects

Immediate effects:

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

Long-term effects:

- Liver diseases
- Cancers
- Hypertension
- Gastrointestinal disorders
- Neurological issues
- Psychiatric issues

Metabolic Risk Factors

What are the four **metabolic** risk factors?

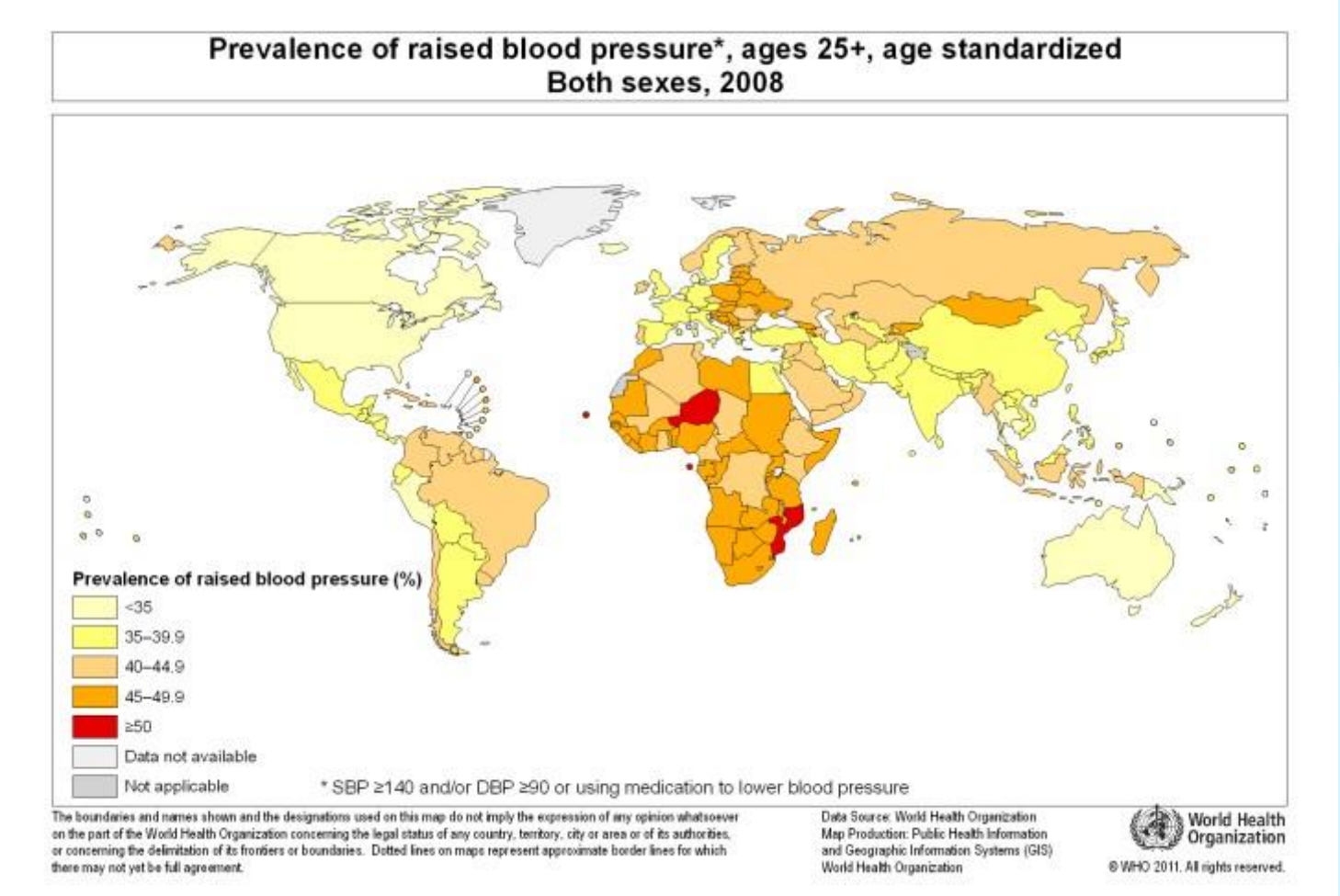
1. Raised Blood Pressure (Hypertension)
2. Raised Cholesterol
3. Raised Blood Glucose
4. Overweight and Obesity

Raised Blood Pressure

- Hypertension
- (Systolic)/(Diastolic) in mm of Hg (mercury)
- Systolic = amount of force your arteries use when the heart pumps
- Diastolic = amount of force your arteries use when the heart relaxes

Measurement	Normal	Pre-Hypertensive	Hypertensive
Systolic mmHg	<120	120-139	140+
Diastolic mmHg	<80	80-89	90+

High Blood Pressure



1. US Department of Health & Human Services, National Heart, Lung, and Blood
2. http://gamapserver.who.int/gho/interactive_charts/ncd/risk_factors/blood_pressure_prevalence/atlas.html

Raised Blood Pressure: Health Effects

- Leading risk factor for stroke
- Major risk factor for coronary heart disease
- 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 hypertension, is a major cause of cardiovascular disease deaths and disability.
- About 10% of cardiovascular disease is caused by excess sodium intake.
- 8.5 million deaths could be prevented over 10 years if sodium intake were reduced by 15%.

Sources of Sodium

- 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

- Recommendations **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.

World Health Organization

Pan American Health Organization
Regional Office of the World Health Organization

Global Burden of Raised Total Cholesterol

- 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.

- What is the prevalence of raised total cholesterol in your country?
  - Search the WHO Global Health Observatory website:

http://www.who.int/gho/ncd/risk_factors/en/index.html

Raised Total Cholesterol: Health Effects

- Increases risks of heart disease and stroke
  - Globally, 1/3 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

http://www.who.int/gho/ncd/risk_factors/cholesterol_text/en/

Overweight and Obesity

- Overweight and obesity are defined as "abnormal or excessive fat accumulation that presents a risk to health." (1)
- BMI - the Body Mass Index

BMI = (weight in kg)/(height in meters, squared)

- Between 25 and 29.9 indicates overweight

- 30 or higher indicates obesity

- Skinfold Thickness Test
- Waist-to-Hip Circumference Ratio
  - Men > 102 cm are considered high risk
  - Women > 88 cm are considered high risk

1. http://www.who.int/dietphysicalactivity/childhood_what/en/index.ht

Overweight and Obesity: Global Burden

- Worldwide, obesity has more than doubled since 1980.
- In 2008, more than 1.4 billion adults, 20 and older, were overweight.
  - Of these, 200 million men and nearly 300 million women were obese.
- 65% of the world's population live in countries where the mortality associated with overweight and obesity is higher than the mortality associated with underweight.
- Globally, in 2010 the number of overweight children under the age of five was estimated to be over 42 million.
  - Close to 35 million of these are living in developing countries.

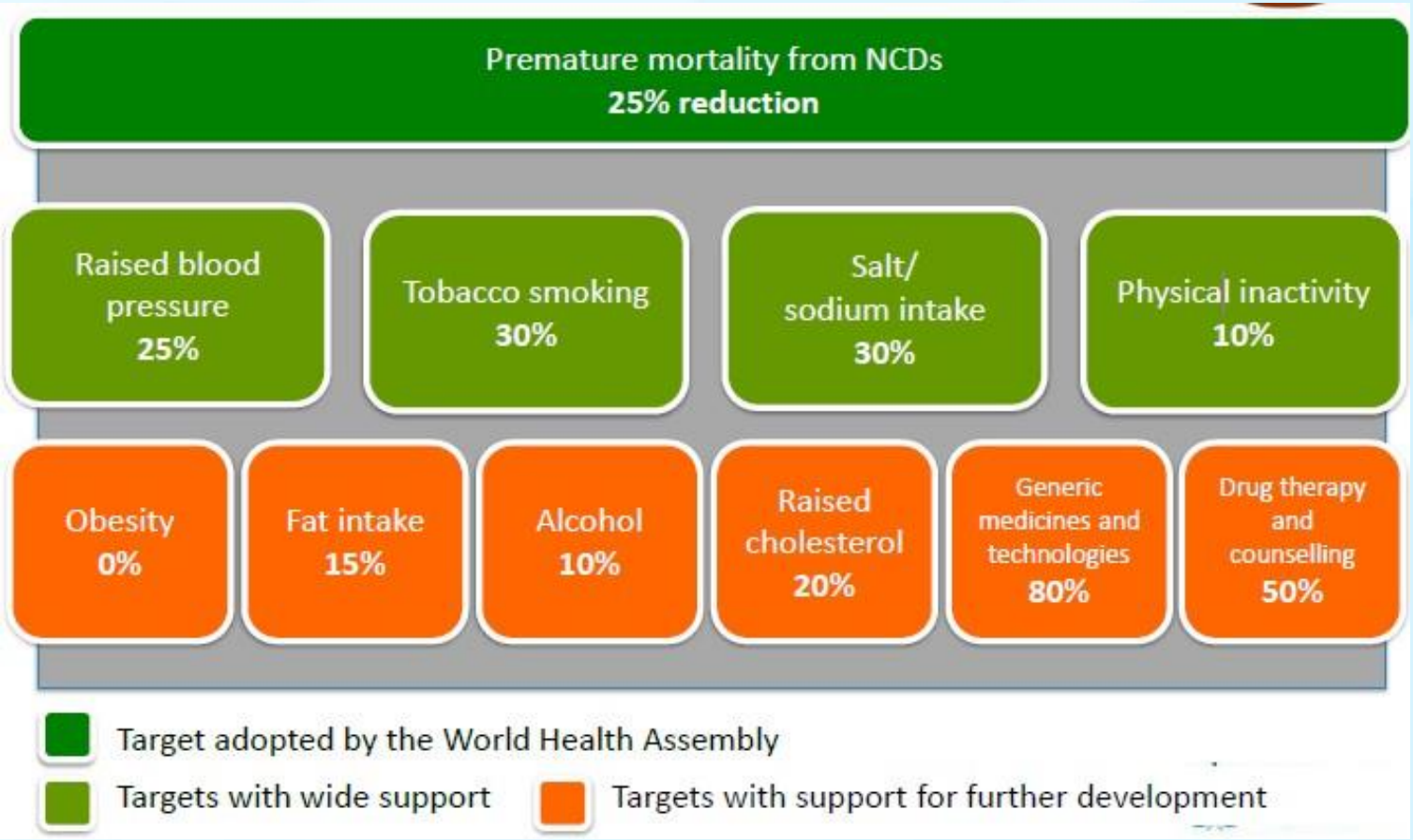
http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html

Overweight and Obesity: Health Effects

- Environment, lifestyle, genetics, and other factors contribute to each individual's risk for being overweight or obese.
- Increases risk of coronary heart disease, type 2 diabetes, and hypertension
- Large economic consequences for many countries
- Resource: http://www.thelancet.com/series/obesity

http://www.thelancet.com/series/obesity

2012 WHO Global Targets: Reducing Risk Factors



http://www.who.int/nmh/events/2012/4November2012_PPT_RevPaper_TA.pdf

Evidence based global interventions

Table 1 Interventions used in this review

Risk factor/ disease	WHO 'best buy'	Specific interventions
Tobacco	Raise taxes on tobacco	Introduce or increase excise taxes
	Protect people from tobacco smoke	Ban smoking in public places
	Enforce bans on tobacco advertising	Advertising/promotion/sponsorship bans
	Warn about the dangers of tobacco	Information and warnings on tobacco packaging
		Mass media campaigns
		Group smoking reduction programmes
		Individual programmes
Unhealthy diet and physical inactivity	Mass media campaigns—physical activity	Evidence-informed campaigns on activity
	Mass media campaigns—diet	Evidence-informed campaigns on diet
	Replace trans fat with polyunsaturated fat	Reformulation
		Labelling
		Mass media campaigns
	Reduce salt intake	Mass media campaigns
		Reformulation
Harmful alcohol use	Raise taxes on alcohol	Introduce or increase excise taxes
	Restrict access to retailed alcohol	Regulating commercial and public availability*
	Enforce bans on alcohol advertising	Advertising/promotion bans

World Health Organization. *Global action plan for the prevention and control of noncommunicable diseases 2013-2020*. http://www.who.int/nmh/events/ncd_action_plan/en/. (cited 07 Mar 2016).

	Counselling and polydrug therapy for high-risk groups†	Prevention: polydrug (≥2 antihypertensives) if BP >160/100
		Prevention: polydrug (≥2 agents) if 10-year CVD risk ≥30%
		IHD/stroke treatment: combination of aspirin+B blocker+ACE inhibitor
Cardiovascular disease		Diabetes (HbA1c >9%): ≥1 antidiabetic; polydrug Rx if BP >165/95
	Treat heart attacks with aspirin	Acetylsalicylic acid for acute myocardial infarction
	Hepatitis B immunisation to prevent liver cancer	Hepatitis B immunisation
Cancers	Screening and treatment to prevent cervical cancer	VIA/Pap smear with timely treatment of precancerous lesions

*We have included legislative age restrictions on alcohol use as a means of restricting access to retailed alcohol.
†Studies on medical treatment were included even if they did not include a counselling component.
BP, blood pressure; CVD, cardiovascular disease; HbA1c, haemoglobin A1c; IHD, ischaemic heart disease; Rx, therapy; VIA, visual inspection with acetic acid.

World Health Organization. *Global action plan for the prevention and control of noncommunicable diseases 2013-2020*. http://www.who.int/nmh/events/ncd_action_plan/en/. (cited 07 Mar 2016).

Thank you

Questions?