

# PARTICIPANT GUIDE



## Overview of NCD's and Related Risk Factors

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# Overview of NCD's and Related Risk Factors

## LEARNING OBJECTIVES

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At the end of the training you will be able to describe the following for your country or region:

- The burden of disease of the four main NCDs
- How risk factors affect the burden of NCDs.

## ESTIMATED COMPLETION TIME

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- 6 hours (includes a 1 hour skill assessment and a 30 minute debrief)

## TRAINING TECHNIQUES

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- Content and examples will be presented using *lectures* and *group discussion*. You will complete the practice exercise in pairs and the skill assessment in a small group.

## PREREQUISITES

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- Introduction to NCD Epidemiology

## REFERENCES AND RESOURCES

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- World Health Organization – Global Health Observatory. [http://www.who.int/gho/ncd/mortality\\_morbidity/en/index.html](http://www.who.int/gho/ncd/mortality_morbidity/en/index.html)
- World Health Organization. *A Comprehensive Global Monitoring Framework, Including Indicators, And A Set Of Voluntary Global Targets For The Prevention And Control Of Noncommunicable Diseases*. 2012. Retrieved from [http://www.who.int/nmh/events/2012/discussion\\_paper3.pdf](http://www.who.int/nmh/events/2012/discussion_paper3.pdf) on May 3, 2013.
- World Health Organization. Media centre fact sheets. Retrieved from <http://www.who.int/mediacentre/factsheets/en/> on May 3, 2013.

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### Learning Objectives

At the end of the training, you will be able to describe the following for your country or region:

- The burden of disease of the 4 main Noncommunicable Diseases (NCDs), and
- How risk factors affect the burden of NCDs.

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### Lesson Overview

- Definition and characteristics of NCDs
- Global trends in NCDs
- 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

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### Noncommunicable Disease (NCD): Definition

- Chronic conditions that do not result from an (acute) infectious process and hence are "not communicable."
- A disease that has a prolonged course, that does not resolve spontaneously, and for which a complete cure is rarely achieved.

McKenna, et al, 1998

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### Characteristics of NCDs

- Complex etiology (causes)
- Multiple risk factors
- Long latency period
- Non-contagious origin (noncommunicable)
- Prolonged course of illness
- Functional impairment or disability

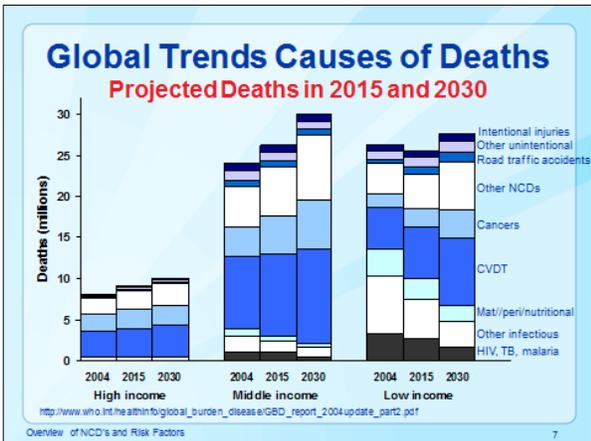
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### Types of NCDs

- 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/nod/mortality\\_morbidity/en/index.html](http://www.who.int/gho/nod/mortality_morbidity/en/index.html)

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## Slide

## Notes

## 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

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## 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](http://www.who.int/nmh/events/2012/discussion_paper3.pdf)

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## Non-Modifiable Risk Factor

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

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

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### 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	✓			

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### 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](http://www.who.int/nmh/events/2012/discussion_paper3.pdf)

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### Knowledge Check #1

1. What are the 4 main NCDs that are the focus of WHO?
2. Which NCD is projected to cause the most deaths by 2030?
3. How would you describe the difference between modifiable and non-modifiable risk factors?
4. What are the 4 modifiable shared risk factors?
5. What are the 4 priority metabolic risk factors?

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FOUR LEADING NCDs

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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

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Cardiovascular Disease:  
Definition

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

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

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### Cardiovascular Disease: Definition (Cont.)

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### 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/](http://www.who.int/cardiovascular_diseases/en/)

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### Cardiovascular Disease: Risk Factors

<p><b>Major modifiable risk factors</b></p> <ul style="list-style-type: none"> <li>- High blood pressure</li> <li>- Abnormal blood lipids</li> <li>- Tobacco use</li> <li>- Physical inactivity</li> <li>- Obesity</li> <li>- Unhealthy diet (salt)</li> <li>- Diabetes</li> </ul>	<p><b>Other modifiable risk factors</b></p> <ul style="list-style-type: none"> <li>- Low socioeconomic status</li> <li>- Mental ill health (depression)</li> <li>- Psychosocial stress</li> <li>- Heavy alcohol use</li> <li>- Use of certain medication</li> <li>- Lipoprotein(a)</li> </ul>
<p><b>Non-modifiable risk factors</b></p> <ul style="list-style-type: none"> <li>- Age</li> <li>- Heredity or family history</li> <li>- Gender</li> <li>- Ethnicity or race</li> </ul>	<p><b>"Novel" risk factors</b></p> <ul style="list-style-type: none"> <li>- Excess homocysteine in blood</li> <li>- Inflammatory markers (C-reactive protein)</li> <li>- Abnormal blood coagulation (elevated blood levels of fibrinogen)</li> </ul>

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### 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

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### Diabetes: Definition

The diagram illustrates the mechanism of insulin and glucose. On the left, labeled 'Normal use of glucose', it shows 'Insulin enters bloodstream from pancreas', 'Glucose enters bloodstream from digestive system and liver', and a 'Healthy balance of glucose and insulin circulate in bloodstream'. Insulin binds to a cell, allowing 'Glucose to enter cell' and be used as fuel. On the right, labeled 'Type 1 Diabetes', it shows 'Unhealthy amount of glucose circulates in bloodstream' and 'No insulin available to bind to cell', resulting in 'Glucose returns to bloodstream' and 'Cell has no glucose for fuel'.

<http://www.drugs.com/health-guide/type-1-diabetes-mellitus.html>

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### 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/fs121/en/>  
 2. <http://www.kdf.org/regions>

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### Diabetes: Risk Factors

<p><b>Major modifiable Risk Factors</b></p> <ul style="list-style-type: none"> <li>- Unhealthy diets</li> <li>- Physical inactivity</li> <li>- Obesity or Overweight</li> <li>- High Blood Pressure</li> <li>- High Cholesterol</li> </ul>	<p><b>Other Modifiable Risk Factors</b></p> <ul style="list-style-type: none"> <li>- Low socioeconomic status</li> <li>- Heavy alcohol use</li> <li>- Psychological stress</li> <li>- High consumption of sugar-sweetened beverages</li> <li>- Low consumption of fiber</li> </ul>
<p><b>Non-modifiable Risk Factors</b></p> <ul style="list-style-type: none"> <li>- Increased age</li> <li>- Family history/genetics</li> <li>- Race</li> <li>- Distribution of fat</li> </ul>	<p><b>Other Risk Factors</b></p> <ul style="list-style-type: none"> <li>- Low birth weight</li> <li>- Presence of autoantibodies</li> </ul>

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### 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

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### Cancer: Definition (Cont.)

**Loss of Normal Growth Control**

The diagram illustrates the progression from normal cell division to cancer. In the top section, 'Normal cell division' shows a single cell dividing into two. One of the resulting cells is shown as a green cell with a starburst, labeled 'Cell damage—no repair', which leads to 'Cell Suicide or Apoptosis'. In the bottom section, 'Cancer cell division' shows a cell undergoing a series of mutations: 'First mutation', 'Second mutation', 'Third mutation', and 'Fourth or later mutation'. These mutations lead to 'Uncontrolled growth', depicted as a large, dense cluster of red and green cells.

<http://www.cancer.gov/qa/noertopics/cancerlibrary/what-is-cancer>

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### 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>  
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### Cancer Epidemiology

Estimated age-standardised incidence and mortality rates: total population

Cancer Type	Incidence (ASIR rate per 100,000)	Mortality (ASIR rate per 100,000)
Breast	~35	~15
Prostate	~25	~35
Lung	~20	~25
Colorectum	~15	~10
Cervix uteri	~10	~10
Stomach	~10	~10
Liver	~10	~10
Corpus uteri	~10	~10
Oesophagus	~10	~10
Ovary	~10	~10
Bladder	~10	~10
Non-Hodgkin lymphoma	~10	~10
Leukemia	~10	~10
Kidney	~10	~10
Pancreas	~10	~10

<http://gloocan.iarc.fr/>  
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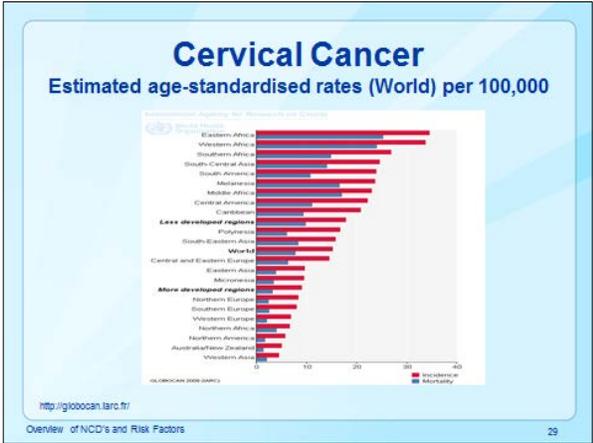
### Cervical Cancer: Definition

Cancer of the female reproductive system:

- Two cell types present (*squamous and glandular*)
- Tend to occur where the two cell types meet
- 99% of cases linked to genital infection with human papillomavirus (HPV)

TAP Pharmaceuticals, "Female Reproductive Systems"  
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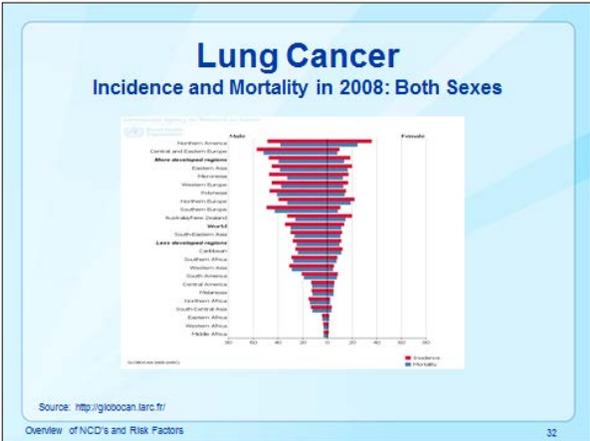
**Slide** **Notes**



- ### 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

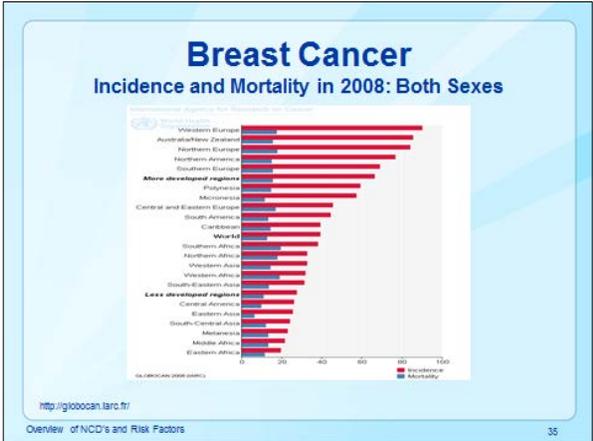
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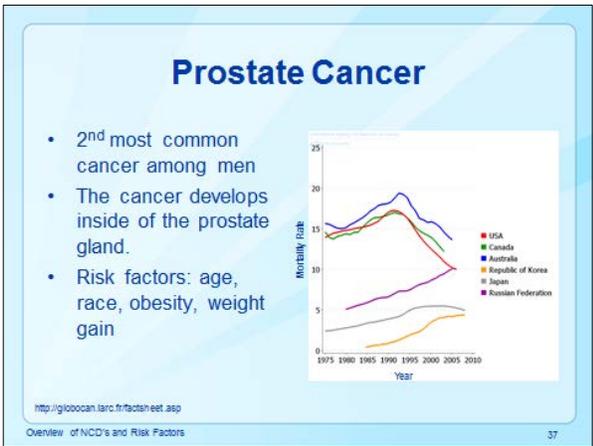
- ### Lung Cancer: Risk Factors
- Smoking cigarettes, pipes, or cigars - now or in the past
  - Being exposed to second-hand smoke
  - Being treated with radiation therapy to the breast or chest
  - Being exposed to asbestos, radon, chromium, nickel, arsenic, soot, or tar
  - Living where there is air pollution
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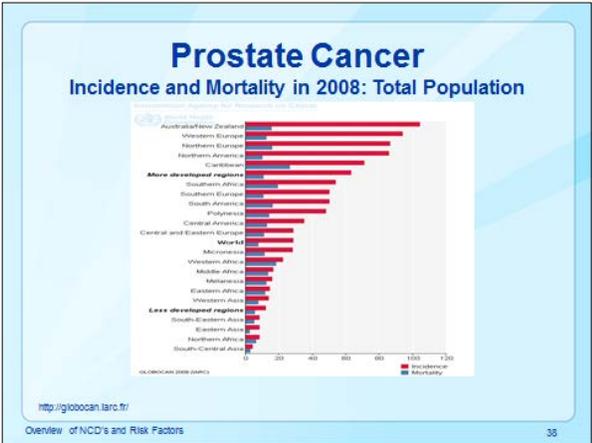
- ### Breast Cancer: Definition
- Cancer that forms in the tissues of the breast, usually in the ducts or in the lobules
  - Occurs commonly in women, rarely occurs in men
  - 1 of 8 women will be diagnosed with breast cancer in her lifetime.
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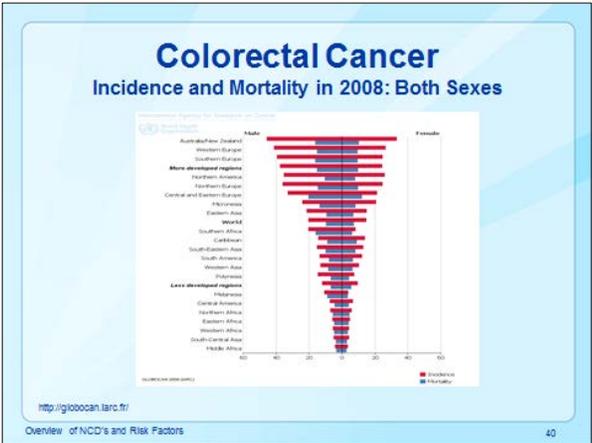


- ### Breast Cancer: Risk Factors
- Hormone therapies
  - Weight and physical activity
  - Race
  - Genetics or family history
    - BRCA1 and BRCA2 genes
  - **Age** is the most reliable risk factor!
    - Risk increases with age
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- ### Colorectal Cancer
- 3<sup>rd</sup> 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/colorectal-cancer/DS00035>
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**CHRONIC RESPIRATORY DISEASES**

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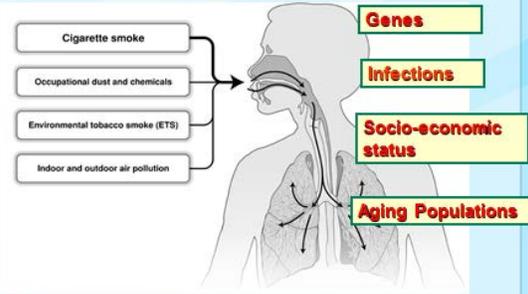
**Global Burden of Chronic Respiratory Disease**

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

[http://www.who.int/respiratory/about\\_topics/index.html](http://www.who.int/respiratory/about_topics/index.html)

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**Chronic Respiratory Diseases: Shared Risk Factors**



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

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### COPD: Definition

- Chronic obstructive pulmonary disease
- COPD – term used for lung diseases that prevent proper lung airflow
- Chronic bronchitis, emphysema
- More than just “smoker’s cough”

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### COPD: Burden

- Accurate epidemiologic data on COPD prevalence, morbidity, and mortality are difficult and expensive to collect.
- 65 million people worldwide have moderate to severe COPD.
- More than 3 million people died of COPD in 2005 (3% of all deaths globally).
- Almost 90% of COPD deaths occur in low- and middle-income countries.

<http://www.who.int/respiratory/copd/burden/en/index.html>

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### Chronic Respiratory Diseases: Asthma

- Recurrent attacks of “breathlessness and wheezing” (WHO, 2012)
- A gradient of severity
- Can cause sleepiness, fatigue
- Low fatality rates, but often underdiagnosed
- 235 million people affected

<http://www.who.int/mediacentre/factsheets/fs307/en/index.html>

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### Chronic Respiratory Diseases: Asthma

Medications can help control asthma

Normal bronchiole



Asthmatic bronchiole



ADAM

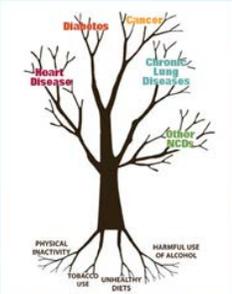
http://www.ncbi.nlm.nih.gov/pubmed/19611961

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### Practice Exercise #1

1. Use the following website to determine the burden of disease of the 4 main NCDs in your country or region:  
<http://www.who.int/nmh/countries/en/index.html>  
 or <http://www.who.int/gho/countries/en/>
2. Spend approximately 10 minutes completing the exercise.
3. Be prepared to share your responses with the rest of the class

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## RISK FACTORS

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### 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.

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### Risk Factor Surveillance

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

WHO Global Health risks report  
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### 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>

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### Global Adult Tobacco Survey

GATS Overview

[http://www.odc.gov/tobacco/global/gats/tobacco\\_atlas/index.htm](http://www.odc.gov/tobacco/global/gats/tobacco_atlas/index.htm)

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### Tobacco Use: Health Effects

**TOBACCO USE IS A RISK FACTOR FOR SIX OF THE EIGHT LEADING CAUSES OF DEATH IN THE WORLD**

Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Medicine, 2006, 3(7): e142

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### Tobacco Use: Health Effects (cont.)

Among smokers:

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

Second-hand smoke causes:

- Heart disease, including heart attack
- Lung cancer



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## DIET

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### 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/~super/44-1011-42001/41171.pdf>

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**Unhealthy Diet: Health Effects**

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



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**PHYSICAL INACTIVITY**

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**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.ods.gov.ph/physicalactivity/level/online/guidelines/adults.html>  
 2. <http://www.sciencedirect.com/science/article/pii/S0140673612609988>

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### Global Changes in Physical Activity (Cont.)

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

6% Coronary heart disease	7% Type 2 diabetes	10% Breast cancer	10% Colon cancer	9% Premature mortality
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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

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### Physical Activity: Health Effects

<p><b>Reduces:</b></p> <ul style="list-style-type: none"> <li>• High blood pressure</li> <li>• Adverse lipid profile</li> <li>• Arthritis pain</li> <li>• Psychiatric issues</li> </ul>	<p><b>Reduces risk of:</b></p> <ul style="list-style-type: none"> <li>• Type 2 diabetes</li> <li>• Certain cancers</li> <li>• Heart attacks</li> <li>• Stroke</li> <li>• Falls</li> <li>• Early death</li> </ul>
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<http://www.health.gov/paguide/lines/factsheetprof.asp>

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## HARMFUL USE OF ALCOHOL

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### 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/subs/ta/ta\\_hoe\\_ab/use/publications/global\\_alcohol\\_reports/membersprofiles.pdf](http://www.who.int/subs/ta/ta_hoe_ab/use/publications/global_alcohol_reports/membersprofiles.pdf)  
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### Global Alcohol Consumption (Cont.)

Figure 1. Total adult (15+) per capita consumption, in litres of pure alcohol, 2005\*

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### Harmful Use of Alcohol: Effects

<p>Immediate effects:</p> <ul style="list-style-type: none"> <li>• Diminished brain function</li> <li>• Loss of body heat</li> <li>• Fetal damage</li> <li>• Risk for unintentional injuries</li> <li>• Risk for violence</li> <li>• Coma and death</li> </ul>	<p>Long-term effects:</p> <ul style="list-style-type: none"> <li>• Liver diseases</li> <li>• Cancers</li> <li>• Hypertension</li> <li>• Gastrointestinal disorders</li> <li>• Neurological issues</li> <li>• Psychiatric issues</li> </ul>
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### 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

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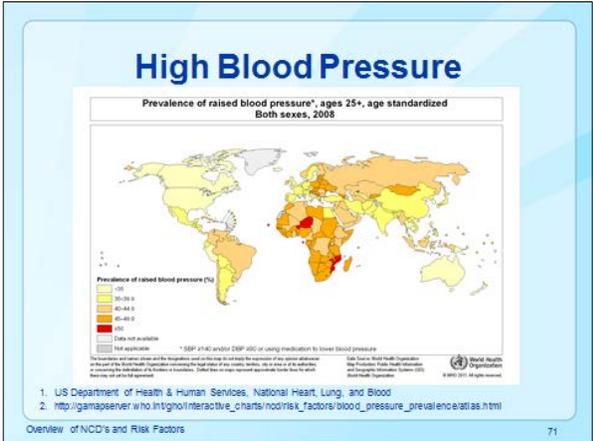
### Raised Blood Pressure

- 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
<i>Systolic</i> mmHg	<120	120-139	140+
<i>Diastolic</i> mmHg	<80	80-89	90+

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- ### 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
- Overview of NCD's and Risk Factors 72

- ### 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%.
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### 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.

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### Recommendations and Actual Intakes WHO/PAHO

- Recommendations
  - 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.




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### 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)




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## Slide

## Notes

## Global Burden of Raised Total Cholesterol

In 2008, global prevalence of raised total cholesterol among adults ( $\geq 5.0$  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](http://www.who.int/gho/ncd/risk_factors/en/index.html)

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## 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/](http://www.who.int/gho/ncd/risk_factors/cholesterol_text/en/)

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## Elevated Glucose

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

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## Slide

## Notes

## Global Burden of Elevated Glucose

In 2004, it was estimated that elevated glucose resulted in 3.4 million deaths (5.8% of all deaths).

Globally, approximately 9% of adults aged 25 and over had elevated blood glucose in 2008.

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## Elevated Glucose: Health Effects

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

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## 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
  - $BMI = (\text{weight in kg}) / (\text{height in meters, squared})$
  - 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.html](http://www.who.int/dietphysicalactivity/childhood_what/en/index.html)

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### 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\\_diseases/2004\\_report\\_update/en/index.html](http://www.who.int/healthinfo/global_burden_diseases/2004_report_update/en/index.html)

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### 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>

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### 2012 WHO Global Targets: Reducing Risk Factors

Premature mortality from NCDs  
25% reduction

Raised blood pressure 25%	Tobacco smoking 30%	Salt/ sodium intake 30%	Physical inactivity 10%		
Obesity 0%	Fat intake 15%	Alcohol 10%	Raised cholesterol 20%	Genetic medicines and technologies 80%	Drug therapy and counselling 50%

■ Target adopted by the World Health Assembly  
■ Targets with wide support    ■ Targets with support for further development

[http://www.who.int/nmh/events/2012/4November2012\\_PPT\\_RevPaper\\_TA.pdf](http://www.who.int/nmh/events/2012/4November2012_PPT_RevPaper_TA.pdf)

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### Knowledge Check #2

1. What percentage of cancers is attributable to behavioral risk factors?
2. Approximately what percentage of the world's population does not get enough physical activity?
3. What percentage of the major NCDs worldwide is attributable to physical inactivity?
4. Tobacco is a risk factor for how many of the leading causes of death in the world?
5. Approximately what percentage of CVD is caused by excessive sodium intake?

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### Practice Exercise #2

1. You will work individually or in pairs to answer the following questions:
  - a) Which 2 behavioral risk factors or metabolic risk factors have the highest prevalence in your country?
  - b) On which risk factors would you focus prevention and control efforts?
  - c) How would focusing on these risk factors effect the prevalence of NCDs in your country?
2. Spend approximately 45 minutes completing the exercise.
3. Be prepared to share your responses with the rest of the class.

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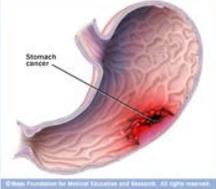
APPENDIX

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**Slide** **Notes**

### Stomach Cancer: Definition

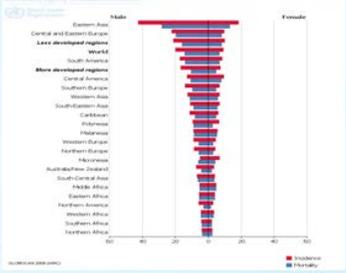
- There are many forms of stomach cancer
- Adenocarcinoma- cell type lining the stomach



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### Stomach Cancer Incidence and Mortality in 2008: Both Sexes



http://globocan.iarc.fr/

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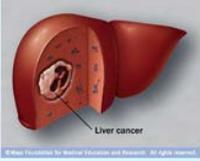
### Stomach Cancer: Risk Factors

- Smoking
- Family history of stomach cancer
- Helicobacter pylori infections, ulcers or polyps
- Diet
  - High salt foods, smoked foods, and pickled foods

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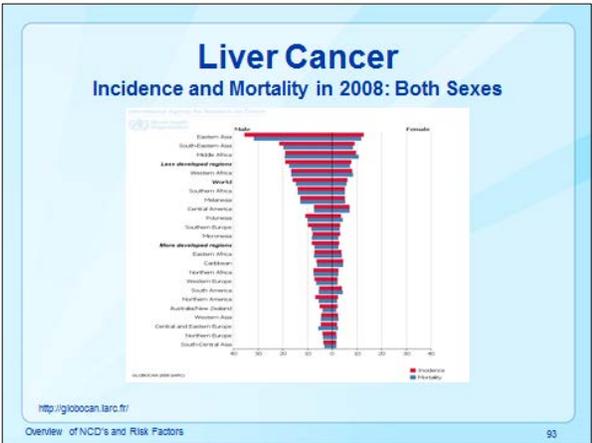
### Liver Cancer: Definition

- Cancer that forms in the liver or spreads from the liver to other areas of the body
- Few early signs of liver cancer
- Several types of liver cancer exist



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### Liver Cancer: Risk Factors

- Sex
- Age
- Chronic hepatitis infections
- Diabetes
- Cirrhosis
- Heavy alcohol consumption
- Obesity

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