Foundations of Global Health

Part I: Non-Communicable Diseases

"The failure to use available knowledge about chronic disease prevention and control endangers future generations." - W.H.O. report, Preventing Chronic Diseases

When mediating over a disease, I never think of finding a remedy for it, but, instead, a means of preventing it.
- Louis Pasteur

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Learning Objectives

- To describe the public health burden of non-communicable diseases.
- To illustrate the disproportionate burden on these diseases in low and middle income countries.
- To identify behavioral risk factors for non-communicable diseases.
- To understand the role of tobacco use and harmful use of alcohol as risk factors for non-communicable diseases.

Non-Communicable Diseases

- 35 million deaths in 2005
- 60% of all deaths are due to chronic diseases
- Higher burden in low-, middle-income countries than communicable diseases.
- Diseases of importance:
  - Cardiovascular disease
  - Diabetes
  - Cancers
  - Mental disorders

Projected deaths by major cause and World Bank income group, all ages, 2005

Projected foregone national income due to heart disease, stroke and diabetes in selected countries, 2005–2015
Non-communicable Disease and Developing Countries

Cardiovascular Disease

• #1 cause of death globally.
  • 17.1 million deaths (2004) or 29%
    – 7.2 million deaths due coronary artery disease
    – 5.7 million deaths due to stroke
  • Disproportionately affects low and middle income countries.
    – 82% of deaths

Cardiovascular Disease Definitions

• CVDs
  – Group of disorders of the heart and blood vessels.
• Cerebrovascular disease
  – Disease of the blood vessels supplying the brain.
• Peripheral artery disease
  – Disease of the blood vessels supplying the arms & legs.
• Rheumatic heart disease
  – Damage to the heart muscle & valves from rheumatic fever (caused by streptococcal bacteria).

Cardiovascular Disease Definitions

• Congenital heart disease
  – Malformations of the heart structure existing at birth.
• Deep vein thrombosis & pulmonary embolism
  – Blood clots in the legs veins which can dislodge and move to the heart and lungs.

CVD Risk Factors

• Unhealthy diet
• Physical inactivity
• Tobacco use
• Behavioral risk factors responsible for 85% of coronary heart disease & cerebrovascular disease.

CVD Underlying Risk Factors

• Globalization
• Urbanization
• Population ageing
• Poverty
• Stress
CVD in Developing Countries

- More exposure to risk factors.
- Less exposure to prevention efforts.
- Less access to healthcare services.
- The poorest are affected the most.

CVD Impact

- Economic impact
  - Household level
  - Macro-economic level

Diabetes

- Affects more than 220 million people worldwide
- 3.4 million deaths (2004)
- 80% of cases in low- and middle-income countries.

- Prevented or delayed by:
  - Health diet
  - Regular physical activity
  - Normal body weight
  - Avoiding tobacco use

Diabetes

- What is it?
  - Chronic disease
  - Type 1: Pancreas does not produce enough insulin.
  - Type 2: Body can not effectively use the insulin it does produce.
  - Hyperglycemia (high blood sugar) due to untreated/uncontrolled diabetes can cause serious damage to body systems, including nerves and blood vessels.

Diabetes Symptoms

- Excessive urination (polyuria)
- Excessive thirst (polydipsia)
- Constant hunger
- Weight loss
- Vision changes
- Fatigue

Diabetes Long Term Effects

- Increases the risk of heart disease & stroke.
  - 50% die of cardiovascular disease.
- Neuropathy in feet.
  - Can result in foot ulcers & limb amputation.
- Blindness due to diabetic retinopathy.
- Kidney failure
  - 10-20% die from kidney failure.
- Increased risk of death
  - At least double that of healthy peers.
### Diabetes Impact

- Financial impact on:
  - Individuals
  - Families
  - Health systems
  - Countries

### Cancer

- 7.6 million deaths worldwide (2008).
- 13% of all deaths.
- Main types
  - Lung (1.4 million deaths)
  - Stomach (740,000 deaths)
  - Liver (700,000 deaths)
  - Colorectal (610,000 deaths)
  - Breast (460,000 deaths)

### Cancer Risk Factors

- Tobacco use
- Harmful alcohol use
- Poor diet
- Physical inactivity
- History of certain infections

- More than 30% of deaths are preventable.

### Cancer Causes

- One single cell mutates from a normal cell to a cancerous cell in a multistage transformation.
- Result of interaction between genetic factors and external agents:
  - 1. Physical carcinogens
  - 2. Chemical carcinogens
  - 3. Biological carcinogens

### Cancer and Developing Countries

- More than 70% of all cancer deaths occur in low- and middle-income countries.

### Mental Disorders

- More than 450 million people worldwide.
- One in every four individuals
- “There is no health without mental health.”
- Determined by socio-economic, biological, environmental factors.
- Stigma & discrimination
### Mental Disorders Risk Factors
- Poverty
- Low levels of education
- Rapid social change
- Stressful work conditions
- Gender discrimination
- Social exclusion
- Unhealthy lifestyle
- Risks of violence
- Physical ill-health
- Human rights violations

### Mental Disorders Response
- More than 40% of countries have no mental health policy.
- 33% of countries allocate less than 1% of their total health budgets to mental health.
- Only 1 psychiatrist: 100,000 persons in over half the countries in the world.
- 40% of countries have less than 1 hospital bed: 10,000 people for mental disorders.

### Mental Disorders & the Poor
- The poor bear the brunt of mental disorders
- More likely to suffer from them
- Less likely to get care
- More vulnerable due to constant exposure to:
  - Stressful events
  - Dangerous living conditions
  - Exploitation
  - Poor health in general

### Shared Risk Factors
- Shared risk factors among many of the non-communicable diseases:
  - Tobacco Use
  - Unhealthy Diets
  - Physical Inactivity
  - Harmful Use of Alcohol

### Shared Risk Factors
- Rates increasing fastest in low-income countries.
  - Steady population growth
  - Tobacco industry targeting
  - Shifts in gender norms
- By 2030, over 80% of tobacco-related deaths will be in low- and middle-income countries.

### Risk Factors: Tobacco Use
- Kills 1 person every 6 seconds.
- 1 in 10 deaths worldwide in adults.
- Second hand smoke
  - 3400 lung cancer deaths in US/yr.
  - 46,000 heart disease deaths in US/yr.
  - 430 cases of SIDs in US/yr.
  - 24,500 low birth weight infants in US/yr.
  - 71,900 pre-term deliveries in US/yr.
  - 200,000 cases of childhood asthma in US/yr.

“Tobacco is the only legally available consumer product which kills people when it is used entirely as intended.” - The Oxford Medical Companion (1984)
Risk Factors: Tobacco Impact

- In U.S.
  - $92 billion/yr.
  - $81 billion/yr. in healthcare costs
- Half of all tobacco-related deaths occur during the prime productive years.
- Developing world
  - 4 out of 5 tobacco deaths will occur by 2030.
  - Resources diverted from essential needs.

Risk Factors: Alcohol Abuse

- Causal factor in more than 60 major types of diseases & injuries.
- 2.5 million deaths/yr.
- 3rd highest risk factor for disease & disability.
- Affects:
  - Men
  - Lower socio-economic status
  - Lower education levels
Practice Questions

- Explain the impact of each non-communicable disease on the poor (or low and middle income countries).

- Explain the role of tobacco use and harmful alcohol use as risk factors.

- Other than direct mortality, what are some ways in which each type of non-communicable disease affects public health and society as a whole?

In Summary...

- Non-communicable diseases have a significant impact on public health.

- Many of these diseases affect low and middle income countries disproportionately.

- The risk factors for non-communicable diseases tend to be behavioral and, thus, preventable.