Cardiovascular Disease: A Global Perspective

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No conflicts or unlabeled use to disclose.
Learning Objectives

The learner should be able to plan research and practice and evaluate evidence by

- applying rigorous definitions of cardiovascular disease (CVD) and distinguishing the major forms of CVD
- relating effort to the course of development of coronary heart disease (CHD)
- estimating the frequency of occurrence of CVD in the US in the early 21st century
- assessing CVD as a global phenomenon
- predicting plausible scenarios regarding the likely burden of CVD in the future
What is CVD?
Percentage breakdown of deaths attributable to cardiovascular disease (United States: 2010).

How big a problem is CVD in the US?
CVD in the US

• 1 in 3 adults have some form of CVD, including high blood pressure
• CVD is #1 cause of death & claims more lives (~1/3rd) than cancers and chronic lower respiratory diseases combined.
• About 34% of people killed are < age 75.
• Life expectancy reduced by 7 years by major CVD

Dariush Mozaffarian et al. Circulation. 2015;131:e29-e322
How big a problem is CVD in the rest of the world?

- Is the US one of the highest rate countries?
- Are CVD rates low in LMIC?
Global burden of stroke

Stroke is the brain equivalent of a heart attack. Blood must flow to and through the brain for it to function. If its flow is obstructed, by a blood clot moving to the brain, or by narrowing or bursting of blood vessels, the brain loses its energy supply, causing damage to tissue leading to stroke.

Annually, 13 million people worldwide suffer a stroke. Of them, 5 million die and another 5 million are left permanently disabled, placing a burden on families and communities. Stroke is uncommon in people under 40 years, when it does occur, the main cause is high blood pressure. Stroke also occurs in about 8% of children with sickle cell disease.

The major risk factors for stroke are similar to those for coronary heart disease, with high blood pressure and tobacco use the most significant modifiable risk factors. Atrial fibrillation, heart failure and heart attack are other important risk factors.

The incidence of stroke is declining in many developed countries, largely as a result of better control of high blood pressure, and reduced levels of smoking. However, the absolute number of strokes continues to increase because of the aging population.

Stroke burden is projected to rise from around 38 million DALYs globally in 1990 to 61 million DALYs in 2020.

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Global burden of coronary heart disease

Disability-adjusted life years (DALYs) lost can be thought of as "healthy years of life lost." They indicate the total burden of a disease, as opposed to simply the resulting deaths.

Cardiovascular disease is responsible for 10% of DALYs lost in low- and middle-income countries, and 15% in high-income countries.

A heart attack occurs when the blood vessels supplying the heart muscle become blocked, starving it of oxygen, leading to the heart muscle’s failure or death. Heart attack has the same risk factors as CVD in general. Cold weather, exercise, or strong emotion can precipitate a heart attack.

Coronary heart disease is decreasing in many developed countries, but is increasing in developing and transitional countries, partly as a result of increasing longevity, urbanization, and lifestyle changes.

Risks of heart attack can change when people migrate. Japan has a low rate of coronary heart disease, but after moving to the USA, Japanese people have been found to have a gradually increasing risk. This eventually approaches that of people born in the USA.

More than 8% of the global burden of coronary heart disease occurs in developing countries.

Disease burden in men Percentage of DALYs lost due to top ten diseases in men aged 15 years and above 2002

- Stroke: 5.8%
- Unipolar depressive disorders: 4.8%
- Road traffic injuries: 4.5%
- Tuberculosis: 4.2%
- Alcohol use disorders: 3.6%
- Violence: 3.2%
- Chronic obstructive pulmonary disease: 3.1%
- Hearing loss: 2.7%
- Diabetic retinopathy: 2.5%
- Cholelithiasis: 2.4%

Disease burden in women Percentage of DALYs lost due to top ten diseases in women aged 15 years and above 2002

- Stroke: 5.2%
- Unipolar depressive disorders: 8.4%
- Chronic obstructive pulmonary disease: 3.1%
- Hearing loss: 2.8%
- Cardiovascular disease: 2.7%
- Depression: 2.6%
- Tuberculosis: 2.6%
- Diabetic retinopathy: 2.3%
- Asthma: 2.0%
- Diabetes mellitus: 1.9%

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Figure 2: Projected deaths by cause, 2004, 2015, 2030.
Countries are divided by the World Bank, by income groups, according to 2004 gross national income per person: low income (US$825 or less), middle income ($826–10,065), and high income ($10,066 or more).
Proportion of AMI Attributed to Cardiovascular Disease Risk Factors

INTERHEART Case-Control Study in 52 Countries (n=29,972)
Age-standardized systolic blood pressure levels by WHO subregion. Age-standardized SBP levels for each subregion were calculated using direct standardization with weightings from the WHO standard population [43].

Burden of Obesity and Diabetes

### Obesity

People who are overweight (possessing a body mass index, or BMI, of 25 or higher) or obese (a BMI of 30 or higher) are now just as common in many developing countries as they are in the U.S., Canada and Europe. In large parts of Latin America, North Africa and the Middle East, the problem has triggered an upsurge in diabetes, heart disease and other illnesses. Obesity rates are also rising quickly in China, India and other Asian nations.

### Diabetes

Estimated prevalence of diabetes in 2007

Map shows type 1 and type 2 diabetes. Obesity and type 2 diabetes are causally linked.

Source: Diabetes Atlas, 2006
World Cigarette Consumption

By region, 2009

- Europe: 24%
- Western Pacific: 48%
- Americas: 11%
- Eastern Mediterranean: 6%
- Africa: 3%
- South-East Asia: 8%

Source: Tobacco Atlas, 4th edition; tobaccoatlas.org

www.TobaccoAtlas.org
Global Cigarette Consumption in One Century
Increased Over 100 Times
Counted in billions of cigarettes

Enough cigarettes were consumed in 2009 for each man, woman, and child in the world to have smoked an average of 865 cigarettes or 43 packs.

source: Tobacco Atlas, 4th edition; tobaccoatlas.org
Top 5 Cigarette-Consuming Countries
2009, counted in millions of cigarettes

China consumed more than 38% of the world’s cigarettes in 2009. More cigarettes were consumed in China than in the other top four tobacco-consuming countries combined.

2,264,900 China
390,000 Russian Federation
315,700 US
260,800 Indonesia
233,900 Japan

The Rest of the World’s Consumption


www.TobaccoAtlas.org
Age-standardized ischemic heart disease mortality rate per 100,000 persons by super region and globally (A, males), 1980 to 2010, the Global Burden of Disease 2010 Study.
Age-standardized ischemic heart disease mortality rate per 100,000 persons by super region and globally (B, females), 1980 to 2010, the Global Burden of Disease 2010 Study.
Population Causes and Consequences of Leading Chronic Diseases: A Comparative Analysis of Prevailing Explanations
Factors contributing to rising risk of chronic disease in developing world

• Globalization is leading to greater inter-country dietary dependence.
• Foreign direct investment in foods and beverages in developing economies favors less healthy products.
• Transnational companies’ marketing strategies influence persons in poor countries to prefer Western products as their income rises.
• Technological change speeds up all these processes.
• Technological change also encourages more inactive lifestyles and shifts the locus of food consumption away from the home.
Future of Global Chronic Disease?

- Chronic Diseases Will Further Widen the Health Gap between Rich and Poor Countries
- Chronic Diseases Are Killing and Disabling People at Their Peak Productivity in LMIC
- Chronic Diseases Will Slow Countries’ Economic Growth Rates
What to do?

• Practice effective Public Health!
Summary and Questions

• CVD is the leading cause of death in US and globally.
• Variations in burden of CHD, stroke, & HF related to variations in RFs.
• Infectious diseases do not have to recede before chronic diseases increase.
• Can CVD rates continue to decline in countries with low and declining rates?
• Can we turn the tide in countries with high or rising rates?
• Can we create a world that is heart healthy and stroke free?