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# Global Burden of Disease

Perspectives in Global Health

N420/WS432

# Definition of Health



“A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”

# How can we measure “health”?





# Components of a measure of health of a community

- Morbidity
- Mortality
- Disability
- Age
- Gender
- Region



# Measuring the Burden of Disease



# Disability Adjusted Life Year (DALY)

“a unit for measuring the amount of health lost because of a particular disease or injury. It is calculated as the present value of future years of disability free life that are lost as the result of the premature deaths or causes of disability occurring in a particular year.”

- A measure of premature deaths and losses due to illness and disabilities in a population.

# DALY

- Developed by the WHO
- Uses the “healthiest” possible population as the standard
- Most common measurement used to measure the burden of disease in a country
- Takes into account years of life lost
  - If a person can expect to live until 80 years old and dies of a heart attack at 40 years of age – lost 40 years of life
- Takes into account disabilities
  - How chronic diseases such as diabetes or TB contribute to disability

# Global Burden of Disease

- Leading causes of illness, disability & death in the world
- How do they vary by age, sex, ethnicity, and SES

**TABLE 2-4** The Ten Leading Causes of the Burden of Disease in Low- and Middle-Income Countries by Region, 2001

<b>East Asia and Pacific</b>	<b>Percentage of total DALYs</b>	<b>Europe and Central Asia</b>	<b>Percentage of total DALYs</b>
1. Cerebrovascular disease	7.5	1. Ischemic heart disease	15.9
2. Perinatal conditions	5.4	2. Cerebrovascular disease	10.8
3. Chronic obstructive pulmonary disease	5.0	3. Unipolar depressive disorders	3.7
4. Ischemic heart disease	4.1	4. Self-inflicted injuries	2.3
5. Unipolar depressive disorders	4.1	5. Hearing loss, adult onset	2.2
6. Tuberculosis	3.1	6. Chronic obstructive pulmonary disease	2.0
7. Lower respiratory infections	3.1	7. Trachea, bronchus, and lung cancers	2.0
8. Road traffic accidents	3.0	8. Osteoarthritis	2.0
9. Cataracts	2.8	9. Road traffic accidents	1.9
10. Diarrheal diseases	2.5	10. Poisonings	1.9
<b>Latin America and the Caribbean</b>	<b>Percentage of total DALYs</b>	<b>Middle East and North Africa</b>	<b>Percentage of total DALYs</b>
1. Perinatal conditions	6.0	1. Ischemic heart disease	6.6
2. Unipolar depressive disorders	5.0	2. Perinatal conditions	6.3
3. Violence	4.9	3. Road traffic accidents	4.6
4. Ischemic heart disease	4.2	4. Lower respiratory infections	4.5
5. Cerebrovascular disease	3.8	5. Diarrheal diseases	3.9
6. Endocrine disorders	3.0	6. Unipolar depressive disorders	3.1
7. Lower respiratory infections	2.9	7. Congenital anomalies	3.1
8. Alcohol use disorders	2.8	8. Cerebrovascular disease	3.0
9. Diabetes mellitus	2.7	9. Vision disorders, age-related	2.7
10. Road traffic accidents	2.6	10. Cataracts	2.3
<b>South Asia</b>	<b>Percentage of total DALYs</b>	<b>Sub-Saharan Africa</b>	<b>Percentage of total DALYs</b>
1. Perinatal conditions	9.2	1. HIV/AIDS	16.5
2. Lower respiratory infections	8.4	2. Malaria	10.3
3. Ischemic heart disease	6.3	3. Lower respiratory infections	8.8
4. Diarrheal diseases	5.4	4. Diarrheal diseases	6.4
5. Unipolar depressive disorders	3.6	5. Perinatal conditions	5.8
6. Tuberculosis	3.4	6. Measles	3.9
7. Cerebrovascular disease	3.2	7. Tuberculosis	2.3
8. Cataracts	2.3	8. Road Traffic Accidents	1.8
9. Chronic obstructive pulmonary disease	2.3	9. Pertussis	1.8
10. Hearing loss, adult onset	2.0	10. Protein-energy malnutrition	1.5

Source: Adapted with permission from The World Bank, Lopez AD, Mathers CD, Murray CJL. The Burden of Disease and Mortality by Condition: Data, Methods, and Results for 2001. In: Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL, eds. *Global Burden of Disease and Risk Factors*. New York: Oxford University Press 2006:91.

# The Global Burden of Disease

- Causes of death for low- and middle-income countries:
  - Non-communicable diseases (54 %)
  - Communicable diseases (36%)
  - Injuries (10 %)
- Causes of death for high-income countries:
  - Non-communicable diseases (87%)
  - Injuries (7.5 %)
  - Communicable diseases (5.7%)

# The Global Burden of Disease

- Leading causes of DALYs for low- and middle-income countries:
  - Perinatal conditions
  - Lower respiratory infections
  - Ischemic heart disease
- Leading causes of DALYs for high-income countries:
  - Ischemic heart disease
  - Cerebrovascular disease
  - Unipolar depressive disorders



# Developing Nations to Get Clean-Burning Stoves



Chef Cooke, flickr

Using a primitive stove in Koluha, India. An alliance that includes the United States wants to replace 100 million stoves by 2020.

**Source:** NY Times article by JOHN M. BRODER

**Published:** September 20, 2010, available at <http://www.nytimes.com/2010/09/21/science/earth/21stove.html>

# Measuring the Burden of Disease

# Health-Adjusted Life Expectancy (HALE)

- A health expectancy measure
- Summarizes the expected number of years to be lived in the equivalent of good health
- Calculated by WHO using a standard methodology
- Years of ill health are weighted according to severity and subtracted from overall life expectancy
- Years of life are weighted life by health status

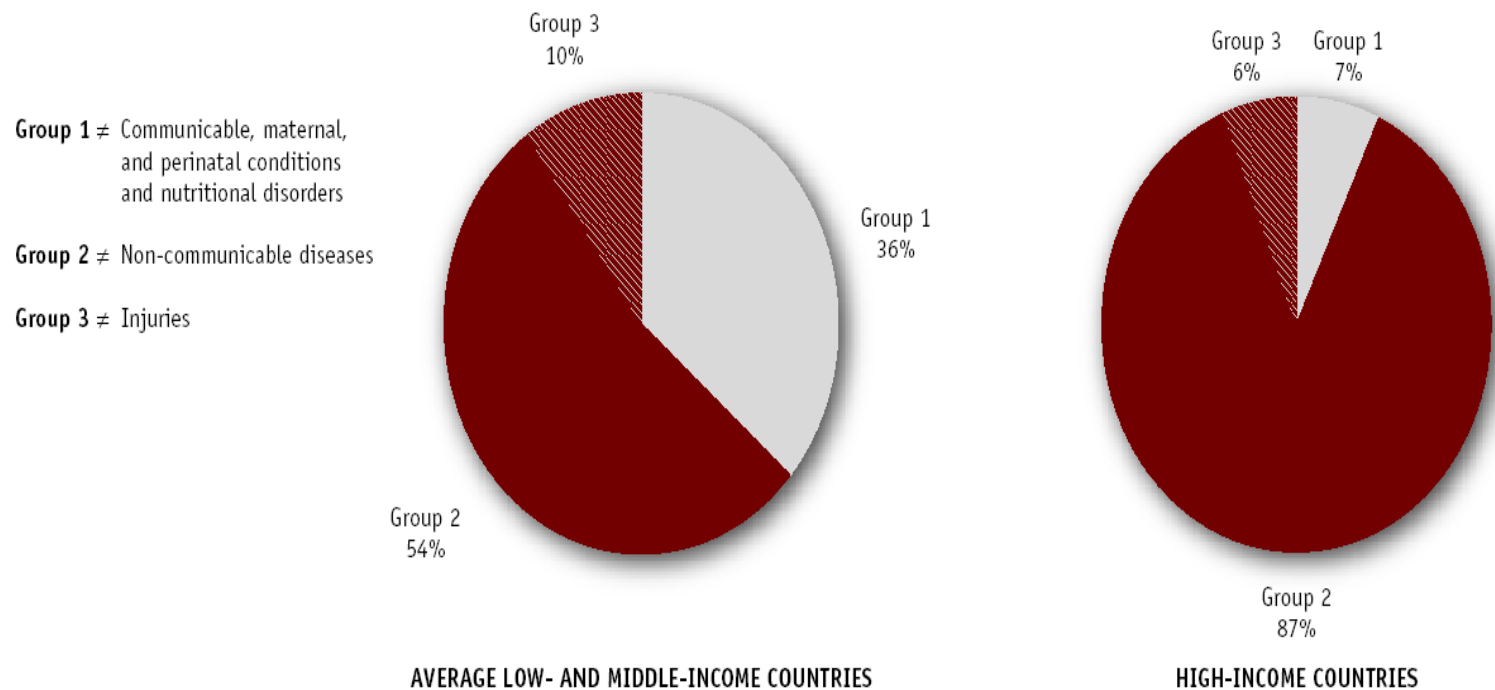
# Life Expectancy at Birth and HALE

Country	Life Expectancy/Health Adjusted Life Expectancy (Females)
• Afghanistan	• 42/35.8
• Bangladesh	• 63/53.3
• Cambodia	• 58/49.5
• Canada	• 83/74
• China	• 74/65.2
• Denmark	• 80/71.1
• Ghana	• 58/50.3
• Haiti	• 56/44.1
• Niger	• 41/35.2
• U.S.	• 80/71.3

# Trends

- Life expectancy has improved in all regions of the world since 1990, except in Europe and Central Asia and in Sub-Saharan Africa
- Communicable diseases will continue to be very important to the burden of disease in South Asia and Sub-Saharan Africa

**FIGURE 2-8** The Burden of Disease by Group of Cause, Percent of Deaths, 2001



Source: Data with permission from The World Bank, Lopez AD, Mathers CD, Murray CJL. The burden of disease and mortality by condition: data, methods, and results for 2001. In: Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL, eds. *Global Burden of Disease and Risk Factors*. New York: Oxford University Press; 2006.



# Trends

- In LIC and MIC
  - Rural people will be less healthy than urban people
  - Disadvantaged ethnic minorities will be less healthy than majority populations
  - Women will suffer a number of conditions that relate to their relatively weak social positions
  - Poor people will be less healthy than better off people
  - Uneducated people will be less healthy than better educated people

What is the leading cause of death worldwide?

# Cardiovascular Disease

# Other Burden of Disease

## Breakdowns of Importance

- Causes of death/DALYs by region
- Causes of death/DALYs by age
- Causes of death/DALYs by sex

# Example from the Field



# Ten Leading Causes of the Burden of Disease in sub-Saharan Africa

Illness	Percentage of DALYs
• HIV/AIDS	• 16.5
• Malaria	• 10.3
• Lower respiratory infections	• 8.8
• Diarrheal disease	• 6.4
• Perinatal conditions	• 5.8
• Measles	• 3.9
• Tuberculosis	• 2.3
• Road traffic accidents	• 1.8
• Pertussis	• 1.8
• Malnutrition	• 1.5





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