Crude health statistics

- Crude health stats are measurements of indicators that come directly from primary data collection with no adjustment or corrections.
- Drawbacks:
  - Incomplete ascertainment
  - Non representativeness
  - Instrument bias
  - Misclassification
  - Distortion

MDG indicator malaria prevalence versus average parasite seroprevalence from MARA systematic review for selected sub-Saharan African countries (Murray, Lancet 2007)
Rates of HIV in pregnant women, 2004, DRC

Data courtesy of the CDC Global AIDS Program, PNLS DRC, 2004
Description of key data sources

<table>
<thead>
<tr>
<th>Description</th>
<th>Strengths</th>
<th>Limitations</th>
<th>Trends</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surveys</strong></td>
<td>National population-based surveys are based on a national sample of households and respondents. Might include only interviews (health interview survey) or with biomarkers (health examination survey).</td>
<td>Information on the entire population and on a wide range of health issues. Vehicle for biological and clinical data collection. Data in the public domain with clear standards possible.</td>
<td>Reporting biases for several health conditions. Low prevalence conditions or rare events need excessive survey sample size. High resource requirements to ensure high quality.</td>
</tr>
<tr>
<td><strong>Vital registration systems</strong></td>
<td>Population-based systems that record livebirths, deaths, and causes of death based on civil registration system (national) or sample registration system (eg, India).</td>
<td>Yearly data for causes of death by age and sex, by small geographic area, when complete.</td>
<td>Incompleteness and poor quality of cause of death recording. If no medical certification, reliance on interviews with relatives to ascertain probable cause (verbal autopsy).</td>
</tr>
<tr>
<td><strong>Population census</strong></td>
<td>Primary source of information about the population, its geographical distribution, and the social, demographic, and economic characteristics of its people.</td>
<td>Covers the whole population; small geographic units; equity information. Data for mortality and fertility for small geographic areas.</td>
<td>Long intervals between censuses (usually a decade). Only small number of health questions included.</td>
</tr>
<tr>
<td><strong>Service records</strong></td>
<td>Service-generated data derived from facilities and patient-provider interactions covering core offered, quality of care, treatments administered, and morbidity and mortality by cause.</td>
<td>Used for service management. Yearly data possible. Basis for disease surveillance systems to detect outbreaks.</td>
<td>Excludes those not reaching the services (selection bias). Incompleteness and data quality. Private sector often not included.</td>
</tr>
<tr>
<td><strong>Administrative records</strong></td>
<td>Information on financial resources, human resources, health infrastructure.</td>
<td>Only source of regular complete data for health resources.</td>
<td>Country databases incomplete and out-of-date; private sector not included.</td>
</tr>
</tbody>
</table>

Source: Boeres J Lancet, 2007
Household surveys are the leading source for child mortality statistics

Mortality data collection and reporting by source in 57 low income countries 1980 -2004
Survey modules for key health statistics with proposed frequency of application and additional data sources

<table>
<thead>
<tr>
<th>Method</th>
<th>Frequency</th>
<th>Indicators</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child mortality</td>
<td>5</td>
<td>Child mortality rates</td>
<td>Death registration preferred source if complete</td>
</tr>
<tr>
<td>Adult mortality</td>
<td>5</td>
<td>Adult mortality rates</td>
<td>Death registration preferred source if complete</td>
</tr>
<tr>
<td>Causes of death</td>
<td>5</td>
<td>Main cause distribution</td>
<td>Death registration with medical certification preferred source</td>
</tr>
<tr>
<td>Mortality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health states (adults)</td>
<td>5</td>
<td>Summary and specific measures for domains</td>
<td>No other sources</td>
</tr>
<tr>
<td>Chronic disease</td>
<td>3-5*</td>
<td>Prevalence of chronic conditions</td>
<td>Recall data often result in poor validity; clinical reports and disease surveillance are complementary sources</td>
</tr>
<tr>
<td>Acute disease (mostly children)</td>
<td>3-5*</td>
<td>Incidence of frequent conditions</td>
<td>As for chronic diseases</td>
</tr>
<tr>
<td>Service coverage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal and child health preventive interventions</td>
<td>2</td>
<td>Coverage immunisation; maternity care, etc</td>
<td>Clinical reports are complementary source</td>
</tr>
<tr>
<td>Maternal and child health treatment interventions</td>
<td>2</td>
<td>Rates of treatment use by those in need</td>
<td>Clinical reports are complementary source</td>
</tr>
<tr>
<td>Chronic conditions</td>
<td>3-5*</td>
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</tr>
<tr>
<td>Risk factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk factors (child)</td>
<td>3-5</td>
<td>Water and sanitation; nutritional status and feeding patterns</td>
<td>No other data source</td>
</tr>
<tr>
<td>Risk factors (adult)</td>
<td>3-5*</td>
<td>Nutritional status; indoor air pollution; smoking, alcohol, etc; sexual behaviour</td>
<td>No other data source</td>
</tr>
<tr>
<td>Health resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health expenditure</td>
<td>5</td>
<td>Catastrophic health expenditure and impoverishment; out-of-pocket payment; insurance</td>
<td>No other data source</td>
</tr>
<tr>
<td>Responsiveness of the health system</td>
<td>5</td>
<td>Summary and specific measures for domains</td>
<td>Health facility client exit surveys are complementary source</td>
</tr>
</tbody>
</table>
Corrected Health Statistics

- Measurements of indicators for which two types of analytical effort might have been taken:
  1. Mapping to the quantity of interest (all measurements where primary data collected are an indirect result of event under study)
  2. Correction for range of known biases

- Drawback
  - Details of efforts to correct for known biases are not often in public domain and can introduce more error into statistics

All available empirical estimates of mortality rates for children younger than 5 years for Ghana and best estimates (Murray, Lancet 2007)
Predicted health statistics

- Predicted statistics are based on a model relating the quantity of interest
- Two types are commonly used:
  1. Forecasting: a relation is established during a period of observation that can be used to predict out of time in the future
     - Commonly used to update corrected stats to a more recent period to produce a series of comparable stats for a base year
  2. Farcasting: Prediction out of sample but within the same time period

Trends in maternal mortality based strictly on predicted statistics for seven countries
Understand where your data comes from!
Key Health Interventions –
Best buys for improving health in
the developing world

EPI 415
January 17, 2008
Can the world tackle its most challenging health problems?

Source: Black RE, Lancet 2003
Despite a dramatic improvement in health in the 20th century...
Progress has been uneven
Developing countries carry a double disease burden

Percentage of deaths by cause

Low- and Middle-income countries

- 36% non-communicable diseases
- 10% communicable diseases
- 10% injuries

High-income countries

- 87% non-communicable diseases
- 7% communicable diseases
- 6% injuries
The 20th century witnessed the largest global increase in life expectancy in history.

Will the 21st century build on the successes of the last century, plateau, or will we see a retreat from the gains of the past?
What threatens to roll back major health gains?

What are the most cost-effective ways of dealing with health problems responsible for the greatest burden of disease and disability?
How many years of healthy life can $1 million dollars buy?

In a developing country, the answer is:

a) 100
b) 1,000
c) 10,000
d) 1 to more than 100,000
Intervention choice matters!

• Decision makers can make a small difference or a large difference in terms of years of healthy life purchased. These decisions—about which diseases or conditions should be targeted and how—can mean the difference between death, disability, and a healthy full life.

• How decision makers choose to spend their scarce health investment dollars could mean the difference between buying just one more year for someone or 100,000 or more years combined for many people.
Some services of health interventions are good buys. Others are not.

Some of the more cost-effective ways of spending that money include:

- Expanding immunization coverage with the six standard child vaccines <cost per year of life bought (DALY): $2-20>
- Switching to the use of combination drugs (ACTs) against malaria where resistance to current inexpensive and highly effective drugs <In Sub-Saharan Africa, the price per year of life bought would be from $8-20.>
- Treating STIs to interrupt HIV transmission <$10-100>
- Improving care of children under 28 days old (including resuscitation of newborns) <cost per year of life bought: $10-400>
The best health interventions:

- Target major causes of death, disability and illness in developing countries;
- Are cost-effective; and
- Can be scaled up easily.
Despite the existence of effective and inexpensive interventions, more than 4 million newborns die each year.

Number of Neonatal Deaths (thousands), 2001

- **World**: 3,896
- **Low- and Middle-Income**: 3,854
- **South Asia**: 1,609
- **Sub-Saharan Africa**: 1,154
- **East Asia and Pacific**: 639
- **Middle East and North Africa**: 188
- **Latin America and Caribbean**: 171
- **Europe and Central Asia**: 94
- **High Income**: 41
Ensure healthier mothers and children
One-half of all child deaths occur in the first 28 days after birth.

Ensure access to emergency obstetric care.
Keep newborns warm and clean.
Vaccinate children against major childhood killers.
Monitor children’s health to prevent and treat childhood pneumonia, diarrhea, and malaria.
Promote good nutrition

Poor nutrition contributes to up to 40 percent of the disease burden worldwide.

Provide children and pregnant women essential nutrients.
Promote at least six months of exclusive breastfeeding for infants.
Lower trans fats in processed foods through legislation/regulation.
Cardiovascular disease is the leading cause of death in low- and middle-income countries.

Deaths in Low- and Middle-Income Countries by Selected Causes, 2001
Reduce deaths from cardiovascular disease

*Cardiovascular disease is the leading cause of death worldwide.*

Promote the use of aspirin and other inexpensive drugs to treat and prevent heart attack and stroke.

Substitute 2% of trans fat with polyunsaturated fat through regulation.

Help smokers quit through higher cigarette prices and cessation therapy.

Prevent Rheumatic Heart Disease
Stop the AIDS pandemic

Forty million people are infected with HIV—26 million are in sub-Saharan Africa.

Offer voluntary HIV counseling and testing. Promote 100 percent condom use among high-risk populations (i.e., sex workers, injecting-drug users, and men who have sex with men).

Treat other sexually transmitted infections.

Advocate school-based programs to educate teens about STIs and HIV.
Stop the spread of tuberculosis

*Tuberculosis (TB) is spreading into new populations and resisting treatment*

Treat active TB cases with short-course chemotherapy.

Increase case detection.

Manage multidrug resistant TB with new drugs and drug combinations.
Control malaria

Malaria claims the lives of 1 million children yearly, and it threatens nearly one-half of the world’s population.

Provide universal access to insecticide-treated nets in areas where malaria is endemic.

Expand intermittent preventive treatment for pregnant women.

Subsidize artemisinin combination therapy to ensure effective treatment.
Most smokers now live in low- and middle-income countries.
Combat Tobacco Use

*Tobacco-related diseases are the fastest-growing cause of disease and disability in developing countries.*

Tax tobacco products to increase consumers’ costs by at least 33% to curb smoking.

Restrict smoking in public places and workplaces.

Provide nicotine replacement therapy and other cessation tools.

Ban tobacco advertising.
Reduce fatal and disabling injuries

*Injuries and violence caused more than 5 million deaths in 2001, with an especially heavy toll on young men.*

Install speed bumps at dangerous intersections.

Increase penalties for speeding; awareness through media; and law enforcement.
Ensure equal access to high-quality health care

In many countries, women, rural residents, and the poor have less access to quality health care.

Train health workers to perform basic surgical procedures and treat common medical conditions.

Help providers choose the most cost-effective interventions.
None of these improvements will be sustainable unless we strengthen health systems!

- Stewardship and regulation
- Organizational structures
- Human resources
- Target resources
Will this be the century of disease?

• HIV/AIDS
• Cardiovascular disease
• Avian flu/emerging infections/pandemics
• The persistence of high, but preventable levels of malaria, TB, diarrhea, and pneumonia
• ?