Public Health in Developing Countries

MUSC Spring Global Health Series

Rima Shretta

Outline

• Public health in developing countries: What is different?
• Key health related indicators
• Communicable diseases
• History of public health
• Millennium Development Goals and progress
• Global efforts
Plenary Brainstorming

• Public Health in Developing Countries: What is different about public health in developing countries vs. public health in industrialized countries?

Public Health in Developing Countries

• 1.2 billion people live on < US $1 per day
• 153 million children are undernourished
• 97% of 115 million children not enrolled in school globally are in developing countries
• 500,000 women die while giving birth
• 1 billion people do not have access to clean water
• 2.4 million do not have access to sanitation
• 9.7 million children aged under five die annually (41% occur in sub-Saharan Africa)
Public Health in Developing Countries

- Over one-third of new HIV infections and 38% of deaths in 2007 occurred in Africa
- Only 3 million people in developing nations have access to antiretrovirals
- Burden of communicable/infectious disease vs. non transmissible diseases
  - About 10 million children die of preventable disease
- Many communicable/infectious disease are neglected diseases: little investment in R&D

Public Health in Developing Countries

- Poor access to health facilities:
  - Uganda: 27.3% of population lives within 5 km radius to a health facility
- Weak health systems
  - Physician: population ratios
    - USA – 1:300
    - India – 1:2000
    - Burundi – 1:33,500
    - Malawi – 1:50,000
Causes of Death in Low & Middle-Income and High-Income Countries

<table>
<thead>
<tr>
<th>Category</th>
<th>World</th>
<th>High income</th>
<th>Low &amp; middle income</th>
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<tbody>
<tr>
<td>Injuries</td>
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<td>Other NCDs</td>
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<td>Cardiovascular diseases</td>
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<td>Diabetes</td>
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<td>Nutritional deficiencies</td>
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<td>Perinatal conditions</td>
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<td>Maternal conditions</td>
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<td>Respiratory infections</td>
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<td>Infectious and parasitic diseases</td>
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Mathers, et al., 2006, *Global Burden of Disease and Risk Factors*

Care at a US Hospital
Treatment at a Typical Health Center in Africa

Drip treatment of cholera victims at a refugee camp in Mozambique. Source: Doctors Without Borders/Médecins Sans Frontières (MSF), New York, NY.
Some Health Related Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Developed</th>
<th>Developing</th>
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<tbody>
<tr>
<td>Under five mortality (per 1,000 births (2007))</td>
<td>6</td>
<td>74 (129 - Least Developed Countries)</td>
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<tr>
<td>Infant mortality rate</td>
<td>5</td>
<td>49 (82 – LDC)</td>
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<tr>
<td>Life expectancy at birth</td>
<td>80</td>
<td>67 (57 – LDC)</td>
</tr>
<tr>
<td>Maternal deaths (per 100,000) (2005)</td>
<td>9</td>
<td>450</td>
</tr>
<tr>
<td>Risk of death during pregnancy (2005)</td>
<td>1 in 7300</td>
<td>1 in 20</td>
</tr>
<tr>
<td>Number of births (per 1,000) women aged 15-19 years (2006)</td>
<td>22</td>
<td>53</td>
</tr>
<tr>
<td>Proportion of children 12-23 months who received at least one dose of measles vaccine (2007)</td>
<td>98</td>
<td>80</td>
</tr>
<tr>
<td>Number of TB cases (per 100,000) population (excluding HIV +ve cases) (2007)</td>
<td>14</td>
<td>234</td>
</tr>
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</table>

Data from UNICEF (2009)

Life expectancy 1960-2002 by World Bank Region

World Bank Report 2004
Causes of Death in Neonates and Children


HIV/AIDs

- Non-discrimination between poor and rich
- Lifestyle choices, socio-economic conditions and cultural situation
- But....affects the poor disproportionately: Southern Africa, the Indian subcontinent, Central and Western Africa
- Southern African region shows highest levels of infection among adults
- India, the USA and Nigeria, data normalized through the factoring in of the total population figure
- Reduction in transmission and prevalence in industrialized countries due to access to ARVs
Global Adult HIV Distribution

Source: WHO (2006)

Tuberculosis

- Airborne disease
- Overcrowding in urban areas, prisons, shelters, unsanitary living conditions
- Highest incidence in Africa and Asia
- Rate of TB infection rises sharply with an increased prevalence of HIV/AIDS
- Sub-Saharan Africa: TB remains the number one cause of death in HIV/AIDS patients
- HIV-positive adults receiving ARV treatment have substantially lower rates of TB infection
- In 2005, nearly 1.6 million people died of TB infection. More than 14 million people worldwide were infected
- Multi-drug resistant strains of the disease
Global Tuberculosis Distribution

Global coverage for DPT3 Vaccine

To Vaccinate or Not?

United States Mortality Rates

French war ministry 1917
British public health poster 1918
British India 1927

Dr. Rima Shretta
History of Medicine, Tropical Medicine and 1890-1910 Epidemic Disease Control

- Insect vectors of human disease; transmission of microfilariae by mosquito → filariasis (Manson 1878)
- Transmission cycle of malaria (Ross 1897)
- Role of “ticks and snails”
- Reservoirs of viral, bacterial and parasitic diseases
- Species Sanitation (environmental modification of specific habitats of vectors)
- Sleeping sickness in Uganda (1/3 of the population of Southern Uganda)
- Epidemics of malaria, plague and kala-azar in India
- Malaria and yellow fever outbreaks in Panama canal project area
- Cholera outbreaks in UK

Cholera

- Transmitted via contaminated food and water
- Prevailing theory in 19th century: spread by miasma in the atmosphere
- August 31, 1854 serious outbreak of cholera in Soho in London: 616 people dead
- John Snow hypothesized that cholera was spread by contaminated water
- Snow interviewed the families of victims and made a map showing the distribution of cases.
- Virtually all the victims had consumed water from a water pump: epicenter
- Microscopic examination of a sample of water revealed particles concluded to be the source
- Handle of the pump removed and the spread of cholera stopped dramatically
- Snow was established as a pioneer in the field of public health
Early 20th century Tropical Health Care Systems

- Medical officer responsible for a defined population (military/civilian expatriates)
- Schools of Tropical Medicine began
- Shift from military to trading ventures
- Research Institutes (South America, Malaysia, India and Africa)
- Malaria eradication era
  - Macdonald Model
    \[ R_0 = \frac{ma^2bp^n}{-r \log_e p} \]

Primary Health Care - 1970s

- 1970s
- Health is a pre-requisite for economic productivity
- Disease is a consequence of poverty
- PHC Alma Ata: 1978
  - De-professionalising basic healthcare
  - Appropriate and affordable
  - Community participation
- Selective PHC (GOBI) by UNICEF
- Eradication of small pox: 1977
Millennium Development Goals (MDGs)

- Established following Millennium Summit (2000): All world leaders present adopted the United Nations Millennium Declaration
- 8 international development goals: All 192 UN member states and at least 23 international organizations agreed to achieve by 2015
- Every individual has the right to dignity, freedom, equality, a basic standard of living that includes freedom from hunger and violence, and encourages tolerance and solidarity
- Aim: to encourage development by improving social and economic conditions in the world’s poorest countries.
- MDGs made to operationalize these ideas by setting targets and indicators for poverty reduction in order to achieve the rights outlined in the Declaration

Millennium Development Goals (2015)

1. Eradicate extreme hunger and poverty (½)
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health (lower deaths by ¾)
6. Combat HIV/AIDS, malaria and other diseases (reverse spread)
7. Ensure environmental sustainability
8. Develop a global partnership for development

"We will have time to reach the Millennium Development Goals – worldwide and in most, or even all, individual countries – but only if we break with business as usual. We cannot win overnight. Success will require sustained action across the entire decade between now and the deadline. It takes time to train the teachers, nurses and engineers; to build the roads, schools and hospitals; to grow the small and large businesses able to create the jobs and income needed. So we must start now. And we must more than double global development assistance over the next few years. Nothing less will help to achieve the Goals."

Kofi A. Annan
Challenges in achieving MDGs

- Inequality in health
- Epidemiological Transition
  - Resurgence of disease: polio (Angola, Chad, DRC)
- HIV/AIDS epidemic
- New pandemics (e.g., H5N1)
- Health care delivery systems
- Effective diffusion of new knowledge & products
- Financing health services
- Migration/unplanned urbanisation
- Conflicts
- Climate change
- Donor driven programmes may not strengthen national capacity

Prospects of Meeting MDGs

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<tr>
<th>Child Mortality</th>
<th>Need – 4% decline per year</th>
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Progress is variable

- **Maternal mortality**
  - Target: 5.4% p.a.
  - Actual weighted rate: 3.2% (only middle East and N. Africa on target)

- **Child mortality**
  - Estimated 44 of 50 developing countries have less than a 20% chance of fulfilling target. SSA will not reach it until 2165

- **HIV**
  - Number of infected people increased to 40 million. 5 million were newly infected in 2005

- **Malaria**
  - Mortality in under-5s almost doubled in eastern and southern Africa in 1990-1998 compared with 1982-1989 but substantial reductions since 2000

Examples of Progress: Maternal and Child Health

- Vietnam:
  - Maternal and neonatal tetanus: less than one neonatal tetanus death per 1000 live births (2005); about 20,000 Vietnamese babies died annually of tetanus in 1980s

- Afghanistan, India, Nepal and Pakistan female volunteers trained to administer polio vaccines and promote immunization against maternal and child tetanus

- Bangladesh vaccinated 33.5 million children between the ages of nine months and 10 years ion 2006

- Afghanistan, India, and Pakistan have reduced the spread of polio through coordinated campaigns

- In rural India, one woman dies every five minutes giving birth
  - Over the last four years in Rajasthan, the percentage of deliveries assisted by skilled birth attendants increased by more than 30 percent.

- UNFPA-led Campaign to End Fistula, worked in 40 countries in sub-Saharan Africa, South Asia and the Arab States in 2006
Some Strategies and Interventions

- Access:
  - Availability
  - Affordability
  - Acceptability
  - Geographic accessibility
- Health systems strengthening
- Training and capacity building
- IEC, BCC
- Private sector partnerships and community based programs
- Some simple interventions:
  - Insecticide treated nets: malaria
  - DOTs: TB
  - Community based distributors, health workers, midwives
  - Supportive supervision
  - ORS, breastfeeding, immunizations
- Cell phone technologies and m-health

A village woman in Bangladesh uses layers of sari cloth to filter drinking water.
Future: Shifting Epidemiology

- Malaria elimination??
- TB eradication??
- Non communicable disease: diabetes, hypertension
- By 2020, an estimated 70% of people who die from smoking-related causes will live in developing countries

![Increasing percentage of obese adults (BMI>= 30) in Brazil](source: Monteiro et al, 2009)
Public Advocacy for Global Public Health

- Health linked to development and quality of life
- Donor funding for health in developing countries: $5.6 billion (1990) to $22.1 billion (2007)
- Governments implemented funding mechanisms and partnerships: Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) and the GAVI Alliance (formerly the Global Alliance for Vaccines and Immunizations).
- Global health public campaigns
- Resources still below what is needed to meet the MDGs and focus of funding imbalanced:
  - in 2007, only 12 governmental and philanthropic organizations provided about 80 percent of funding for research and development (R & D) in global health
  - Approximately 80 percent of this funding went toward three diseases: HIV/AIDS, tuberculosis (TB), and malaria.
  - Many other health problems contributing to mortality burden in developing countries; pneumonia and diarrhea, receive far less funding and visibility

Some Initiatives and Advocacy Campaigns for Global Health

- American Idol
- Bill & Melinda Gates Foundation
- USAID
- The Global Fund
- DFID
- Join (RED) on Facebook