WEEK 7: HOW CAN LDC IMPROVE HEALTH & NUTRITION?
F-2007

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I. Key Factors that Affect Health & Nutrition

- Economic prosperity: trends in economic growth & development vs. economic stagnation
- Population-related factors: trends in population growth, fertility rate, migration/refugees, and age composition
- Social factors: trends in urbanization, housing, sanitation, hunger & malnutrition, education, poverty, unemployment, and environmental conditions
II. Global Health Trends: Key Indicators

A. Life Expectancy (def. Life expectancy at birth)—a key mega-indicator

- Steady improvement—now 67 yrs worldwide (2003, World Bank)
  - Due to both national and international efforts:
    - Investments in health, sanitation, water systems
    - Medical interventions—vaccines, antibiotics
    - Health campaigns—smallpox, polio
    - Economic development, rising incomes

- But large differences between: (2003, World Bank)
  - Poor/rich countries, 20 year gap
    - High income—78 yrs
    - Low income—58 yrs
  - Regional of the world, 31 year gap (2000-05, WRI) (Fig. 2)
    - N. America—77 yrs
    - Europe—75 yrs
    - LAC—71 yrs
    - Asia (exc. M.E)—68 yrs
    - Sub-Saharan Africa—46 yrs

- Country & Gender (male/female) (2003, World Bank)
  - Highest—Japan (82 yrs)—78 vs 85 yrs (male/female)
  - US (78 yrs)—75 vs 80 yrs Note—US in 1900=47 yrs
  - Successful LDCs
    - China (71 yrs)—69 vs 73 yrs; Indonesia (67 yrs)—65 vs 69 yrs
    - India (63 yrs)—63 vs 64 yrs
  - Lowest—Zambia (32 yrs), Zimbabwe (33 yrs) (2000-05, WRI)

- Huge difference (≈ 50 yrs) between least & most developed countries largely due to
  - Infant/child (<5 yrs.) mortality rates
  - Civil conflict (Sierra Leone, Sudan, Congo)
  - AIDS in recent years (Sub-Saharan Africa) (Figure)
  - Impact of higher income & technological progress (Fig. 1.9)

- Threats to continued progress?
  - New world health threats?
    - Examples?
  - Threats to continued investments in improving world health?
    - Examples?
B. Infant (<1 yr) & Child < 5 yrs) Mortality (def: death/1,000 births)

- **Large reduction** in all regions (!!)
  - Infant mortality decline, by region, 1965-70 vs 2000-05
  - **World**: -54%
  - **DCs**: -31%
  - **Africa**: -61%
  - **Asia**: -47%
  - **LAC**: -35%

- **But much regional variation** in infant/child mortality rates (rates)
  - Child (<5 yr) mortality/1,000 (2003, World Bank)
  - **World**: 84
  - **High income**—7
  - **Low income**—119

- **And large variation** in child mortality among counties (2003, World Bank)
  - **Highest**: Sierra Leone (284), Niger (262)
  - **Lowest**: Sweden, Finland, Spain (4), Japan, Singapore (5)
  - **Interesting!**: China (37) vs. India (87)
  - **USA** ranks 29th (8)
  - **Note**: In 1900, the US’s infant mortality rate=165

  **Why?**

C. Maternal Mortality (def: deaths/100,000 births)

- **Incidence**
  - ♦ 500,000/yr, 99% in LDCs (480 per 100,000 births)
  - ♦ Rate varies by region (2000, World Bank)
  - ♦ **SS Africa**—916/100,000
  - ♦ **S.Asia**—567/100,000
  - ♦ **LAC**—193/100,000
  - ♦ **E. Asia**—116/100,000
  - ♦ **High income**—13/100,000
  - ♦ **Note**: US now 17/100,000, but in 1900=850/100,000

- **Lifetime Risk**
  - ♦ North America—less than 0.03% lifetime risk
  - ♦ Sub-Saharan Africa—6% lifetime risk of death in childbirth

- **Contributing factors** (LDCs)
  - ♦ Lack of prenatal care
  - ♦ Lack of delivery care
  - ♦ Lack of post-maternal care
  - ♦ Compounded by poor maternal nutrition

D. Big Differences in Health Indicators Within Countries

  **Why?**
III. Leading Causes of Death

A. Causes of Death in DCs vs LDCs (All Ages, 1993—no new data)  
(Figure 8.7)

<table>
<thead>
<tr>
<th>Cause</th>
<th>DCs (%)</th>
<th>LDCs (%)</th>
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</thead>
<tbody>
<tr>
<td>Circulation/degenerative</td>
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<td>10</td>
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<td>Cancer</td>
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<td>9</td>
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<tr>
<td>External</td>
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<td>8</td>
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<td>48</td>
</tr>
<tr>
<td>Respiratory</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Birth related</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>15</td>
<td>17</td>
</tr>
</tbody>
</table>

Discussion
- Key causes of death in DCs? (US: Historical causes)
- Key causes of death in LDCs? What’s missing?

Note DC vs. LDC differences…future for LDCs?
For example: Globesity—Thrifty gene plus social trends! Examples?

B. Causes of Child (<5 yrs) Deaths in LDCs
   
   (Fig)

   - Perinatal causes (birth-related) 23%
   - Acute respiratory infections 19%
   - Diarrhea 13%  
   - Malaria 9%
   - Measles 5%
   - HIV/AIDS 3%  
   - Other 28%

   Malnutrition—a major contributing factor, associated with 55% of child deaths, makes kids more vulnerable  
   (Figure)

C. Many of these cause of death are easily preventable/curable
   - So what’s the problem?
IV. Major Health/Disease Threats in LDCs Today

A. Examples of successes!

- **Smallpox** (only disease to ever be eradicated!) (Photos)
  - Traditional vaccination used in W. Africa/Turkey
  - Modern vaccine invented in early 1800s (US/Europe)
  - Eradicated worldwide, WHO campaign, 1970s

- **Polio**—Major WHO campaign is having success
  - Cases have fallen by 95% since 1988
  - Eradicated in 190 countries by 2000
  - Still at endemic level in several countries
  - **Projected** to be eradicated worldwide by 2005? (Map, Photos)

- **Guinea Worm**
  - In 2000, cases down by 97% from 1986 (3 million cases) (Map, Photos)
  - Funded by Gates Foundation--$2.8 million
    - Filter water
    - Educational campaign

B. New & Emerging Infectious Disease

- 1970s--great optimism about conquer infectious diseases
- Today—renewed concern

- Interrelated mix of contributing factors responsible
  - Ecological changes (e.g., global warming, land use changes)
  - Human factors (e.g., war, sexual behavior, IV drug use, overcrowding)
  - International travel & commerce (e.g., travel, global markets)
  - Technological & industrial factors (e.g., food processing, livestock handling, organ transplants)
  - Microbial changes (e.g., antibiotic & pesticide resistance)
  - Breakdown of public health measures (e.g., sanitation, vaccination, insect control)
C. Major Infectious Diseases in LDCs

- **Definitions**
  - Epidemic—many cases of a disease in a localized area (1%)
  - Pandemic—multiple geographically dispersed epidemics

- **Key Diseases in LDCs & Method of Transmission**
  - Note: US & Europe had most of these problems 100 yrs ago!
  - Diarrhea/dysentery—*water/food* borne bacteria
  - Typhoid/cholera—*water/food* borne bacteria
  - Tuberculosis & bronchitis—*airborne* bacteria
  - HIV/AIDS—*sexual contact*, contaminated blood
  - Malaria, river blindness, yellow fever, sleeping sickness, dengue fever—*vector/insect* borne

- **Biggest danger to you** if you visit a developing country?

D. Major Health Threats & Initiatives

1. *Malaria* Resurgence (good aspects, slowed colonialism in Africa?)
   - **Extent of the Problem**
     - 1 million die annually (90% in Africa & increasing) *(Figure)*
     - 200-500,000 new cases each year, 70% young children
     - 20% world’s population (90 countries) threatened *(Fig/Photo)*
     - “Airport” malaria a new problem in Europe & the US *(Photo)*
     - Major economic impact in Africa--GDP 20% less

   - Note: Sickle cell gives some protection

   - **Contributing Causes of resurgence**
     - Global climate change
     - Drug resistance (chloroquine) *(Figure)*
     - Mass human migrations (civil conflicts)
     - Deteriorating health systems
     - Ban on DDT spraying *(Silent Springs)*, eco-imperialism? *(Fig)*
     - Mosquito resistance to pesticides
1. Prevention & Treatment ("Roll Back Malaria")
   - Multiple prevention (treated bed net, spraying)
   - Focus on mothers & kids (most vulnerable)
   - Rapid community-based diagnosis & treatment (pill, $0.27)
   - Research to develop a vaccine (Gates foundation)
   - Return to spraying DDT (South Africa)

2. HIV/AIDS
   **Extent of the Problem**
   - First diagnosed in 1981
   - **2005:** 39 million infected, 3.1 m. deaths, 5 m. new cases
   - Spreading rapidly, more people have died of AIDS than all wars!
   - LDCs=>90% cases, but DCs=90% expenditures for treatment
   - Growing threat in India (5 million), China & Russia (0.9 million)

   **Sub-Saharan Africa most threatened today**
   - Two thirds (63%) of world’s cases (>25 million) in 2005
   - 7 countries, HIV/AIDS rate >25% (Figure)
     - Note: S. Africa = >5.1 million, most cases in any country
   - 17 million have died, 23% of all deaths in 2000
   - Projected lifetime risk high (Figure, UNAIDS)
     - Shift in cases from elites to marginalized people
       - Urban to rural
       - Rich to poor
       - Men to women (54%), 1.9 x higher than rest of world
         - Why? (Figure)
       - Older to younger female
         - 2/3 new cases are 15-19 yr females,
         - 3/4% of infected 15-24 year old are female
**Direct & Indirect Impacts**

- Increased health costs for government & families
- Less government $ for other investments
- Reduced future GDP (30% reduction in most-affected countries)
- Lost wages & loss of skilled labor (e.g., South Africa)
- Wives left without husbands’ income
- Orphans/grandparent-led families (15 m. orphans, 95% Africa) *(Fig)*
- Loss of farm labor, farmland abandoned (satellite photos) *(Figure)*
- Undermined educational system (e.g., Kenya)
- Life expectancy—fall to <40 yrs. in 11 African countries by 2012 *(Fig)*

**Factors Contributing to Rapid Spread in SS Africa (pandemic)**

- Characteristics of the virus
  - Customs/gender inequality (“sugar daddies”)
  - Economic patterns/seasonal migration to jobs
  - Limited health awareness & low level of education
  - Weak medical systems & high cost of treatment
  - Large rural populations
  - Some governments have been slow to respond
**Prevention & Treatment**

- Government commitment/political will is critical to success
- Provide sex ed at schools & via tradition/modern media  
  ![Photo](Photo)
- Provide free access to condoms ($14/year)  
  ![Photo](Photo)
- Treat other STDs immediately
- Provide voluntary testing/counseling (stigma)  
  ![Photo](Photo)
- Prevent mom to child transmission (at birth & via breast feeding)
- Make available anti-retroviral drugs (new goal, but expensive!!)

**WHO: Continuum of care**  
![Figure](Figure)

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**Some Successful Initiatives**

- Behavioral modification (social marketing) most important
  - S. Africa—educational/media programs to mobilize whole community, including sex workers (provides free condoms)
  - Kenya (KICOSHEP program)—targets slum kids with education, testing, counseling, positive living classes; uses “soap operas” to educate about prevention, treatment
  - Zambia (HEART program)—promotes abstinence among youth via songs, TV commercials, radio adds, posters
  - Senegal—enlisted religious leaders, encouraged youth to delay sex/use condoms, targeted prostitutes with safe-sex campaigns & testing
  - Uganda—President spoke out, launched an awareness campaign, opened Africa’s 1st voluntary testing/counseling centers
  - Sub-Saharan Africa—boosting women’s economic opportunity, passing legislation to ban/modify traditional customs (bride price), say no to "sugar daddies", ABC (abstinence, be faithful, condoms)
But, must also increase access to treatment
- S. Africa—private sector providing treatment to its employees
- Brazil/Thailand—cut cost of treatment by making generic drugs and distributes them free; forced drug price reductions
- Botswana—launched Africa’s 1st universal drug treatment program (cost = $7-10,000/patient/yr), >90% adherence rate
- US committed $15 billion for AIDS treatment/relief—but criticized for emphasis on abstinence, not linked to reproductive health pgms.

Moral Issue Facing DCs & Drug companies
- Generic drug costs $300/yr vs $10-12,000/year for patented drug
- LDCs wanted right to make/import generics when facing a national health epidemic (HIV/AIDS, TB, malaria), but US (via WTO threatened sanctions for voiding drug patent
- Recently, drug countries were pressured to allow manufacturing in LDCs (e.g., Brazil, Thailand) for sale in LDCs, reduce drug prices

3. Childhood Diseases
   - Extent of the Problem
     - Today, 50% of childhood deaths (4.9 million) due to diarrhea, pneumonia, malaria, and measles
   - Prevention & Treatment (“Integrated Management of Childhood Illness”)
     - Health education
     - Prompt recognition of symptoms
     - Rapid treatment, including oral rehydration
     - Immunization, breast feeding (not Similac)
     - Monitor kids health

4. Maternal Mortality & Perinatal Conditions
   - Extent of the Problem
     - 500,000 women die each year
     - 50 million women suffer from pregnancy-related conditions
     - Accounts for 1/5 of childhood deaths
5. **Tuberculosis**

- **Extent of the Problem**
  - 1.7 million die, 8 million new cases each year
  - 1/3 of the world’s population has latent TB
  - Poorest must vulnerable
  - Growing drug resistance

- **Prevention & Treatment** (“DOTS”—80% success rate)
  - Government commitment to sustained control
  - Insure early detection
  - Provide access to drugs
  - Supervise treatment for 6-9 months

6. **Tobacco–Related Diseases**

- **Extent of the Problem**
  - 1.1 billion smokers, most living in LDCs (80%)
  - 5 million deaths/year, 10 million by 2020 (70% in LDCs)
  - Tobacco firms target LDC/youth—sponsor teams, free cigarettes

- **Prevention**
  - WHO treaty (“Framework Convention for Tobacco Control”)
    - Requires strict regulations on marketing/labeling, higher taxes;
    - Signed by 94 countries but **not** the U.S.
    - Thailand—banned public smoking, can’t display tobacco products, gruesome packages

7. **Landmines**

- **Extent of the Problem**
  - 24,000 civilians killed per year, many more maimed
  - 100 million landmines in 64 countries

- **Prevention**
  - NGO-sponsored treaty to ban landmines, ratified by many countries, but **not** the U.S.
8. Water/Food-borne Diseases
   o Examples?

   o Prevention
     ✓ Education
     ✓ Clean drinking water/water treatment (50% in 2005)
       Non-health related benefits: saves women’s time,
       increases girls’ school attendance, price of water for the poor

     ✓ Proper human waste disposal/latrines
       India—”pay-as-you-go” community toilets + biogas generator

V. Strategies For Improving Health & Nutrition

Health Is a Key Social Goal: Governments should give priority to The attainment by all peoples of a level of health permitting them to lead socially & economically productive lives. (WHO)

A. LDCs Must give priority to:

   o Investing in improving sanitation, water treatment, health systems but this will be difficult
     ✓ Health budget = <$15/capita in many poor LDCs
     ✓ Constraint: debt crisis, national poverty

   o Building stronger partnerships between government and
     ✓ NGOs (e.g., India),
     ✓ UN agencies (e.g. UNAIDS, WHO, UNICEF, UNDP, UNESCO)
     ✓ Private sector
     ✓ DCs
o **Seeking innovation ways** to promote health education & treatment
  ✓ Boiling water, constructing latrines
  ✓ AIDS awareness, condom distribution
  ✓ Breastfeeding via
  ✓ Media: Soap operas (India), plays/songs (Sub-Saharan Africa)
  ✓ Traditional healers (Sub-Saharan Africa)
  ✓ Religious leaders (Asia, Sub-Saharan Africa)
  ✓ Barefoot/community health workers (China, Brazil)

o **Making the Home the 1st Hospital**
  Emphasize "primary" care, not "hospital" care
  ✓ Barefoot doctors/rural health workers (Photo)
  ✓ Rural health clinics, rather than hospitals

o **Promoting Simple, Successful, Cost-Effective Interventions**
  ✓ Immunization ($15/child)—DPT, polio, measles, TB
  ✓ Stop diarrhea via oral rehydration (salt+sugar+water)

o **Providing the sick with greater access to drugs**

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o **Examples of National/NGO-based/Local Initiatives**
  ✓ Peru—"conditional transfer program ($30/month)
  ✓ India—provide health care in slums, promote building of "loos"
  ✓ S. Africa—community taking on burden of AIDS care
  ✓ Worldwide—invest in safe water (50% now have piped water)

B. **Health Threats Can Not Be Solved Solely by Health Interventions**
  ✓ Health problems have many interrelated causes
  ✓ Need broad ranging interventions (Figure)

C. **DC Can Help by Providing More International Assistance**
  ✓ Entwined world (West Nile-type virus, malaria)
  ✓ An hopeful sign—US & Europe’s new commitment to funding AIDS prevention/treatment
Figure 2 Life Expectancy, by Regions, 1950-2000

**Crude Death Rate for Infectious Diseases --- United States, 1900-1996**

Deaths per 100,000 population per year

Source: U.S. Centers for Disease Control and Prevention, Notifiable Diseases.

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**Causes of Child Mortality, Worldwide**

Deaths to Children Under 5, by Cause, 2000

- Acute Respiratory Infections: 19%
- Other: 28%
- Diarrhea: 13%
- Malaria: 9%
- Measles: 5%
- Perinatal Causes*: 23%
- HIV/AIDS: 3%

*Perinatal causes include infections, birth injury, asphyxia, and problems relating to premature births.
Child Malnutrition Measures, by Region

Children Under 5, Most Recent Data Available, 1995-2001

Percent

- South Asia: 15%
- Sub-Saharan Africa: 10%
- Middle East/North Africa: 5%
- East Asia/Pacific: 4%
- Latin America/Caribbean: 2%
- CEE/CIS* and Baltic States: 4%

* Central and Eastern Europe and the Commonwealth of Independent States (former Soviet Union).


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Malaria Burden

Disease Burden

- 300-500 million clinical cases per year
  - 80% of cases in Africa
- 1 million deaths per year
  - > 90% of deaths in Africa
- Disability from severe form of the disease
- 40 million DALYs lost annually
Drug Resistance

- Chloroquine resistance
- SP resistance
- Multi-drug resistance

Roll Back Malaria

**Goal:**
Reducing the global burden of disease associated with malaria within ten years through massive increase in availability of existing interventions, and focused investment in new products.

**Means:**
A global movement, backed by a range of partners, with high quality support from WHO.
Map of HIV Prevalence in Sub-Saharan Africa

- 2001:
  - 20.1% - 20.9%
  - 15.1% - 20.0%
  - 5.1% - 15.0%
  - 0.0% - 1.0%
  - Data unavailable / not in region

Increase in Children Orphaned by AIDS

Sub-Saharan Africa

Distribution of Orphans, by Country, 2005

AIDS’ Effect on African Agriculture

Agricultural Labor Force Lost to HIV/AIDS, 1985-2020 (Projected)

AIDS’ Effect on Life Expectancy in 2010

Projections for Selected Countries
Life expectancy at birth, in years

<table>
<thead>
<tr>
<th>Country</th>
<th>With AIDS</th>
<th>Without AIDS</th>
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<tbody>
<tr>
<td>Botswana</td>
<td>52</td>
<td>31</td>
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<td>Zimbabwe</td>
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HIV/AIDS Prevention and Care Continuum

- Prevention: behavior change, STI management, universal precautions
- Postexposure prophylaxis
- Voluntary counseling and testing
  - Provide psychosocial support to patients and families
  - Support orphans and vulnerable children
  - Prevent and treat opportunistic infections
  - Prevent mother-to-child transmission
  - Provide home-based care
  - Administer antiretroviral therapy
  - Provide palliative care

Source: Family Health International

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Country: Number of landmines

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Landmines</th>
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<tbody>
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<td>Angola</td>
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<td>9-10 million</td>
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<td>21 million</td>
</tr>
<tr>
<td>Cambodia</td>
<td>8-10 million</td>
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<tr>
<td>Kuwait</td>
<td>5-10 million</td>
</tr>
<tr>
<td>Latin America</td>
<td>0.3-1 million</td>
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<tr>
<td>Mozambique</td>
<td>2 million</td>
</tr>
<tr>
<td>Somalia</td>
<td>1 million</td>
</tr>
<tr>
<td>Republic of former Yugoslavia without Kosovo</td>
<td>6 million</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>3.5 million</td>
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</table>
Figure 4. Interventions to deal with malnutrition and infection. Reprinted with permission from Reference 3.
Skilled Care at Delivery and Maternal Deaths
Regional Comparisons, 1998-2004

- Sub-Saharan Africa: 42%
- South Asia: 36%
- Middle East and North Africa: 22%
- Latin America and the Caribbean: 19%
- East Asia and the Pacific: 11%
- Central, Eastern Europe, and the CIS*: 93%

* Commonwealth of Independent States (former Soviet Union)

Source: UNICEF, End of Decade Data Base—Maternal Health (http://www.who.int/pbd/maternalHealth.htm)

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Effect of AIDS on Child Mortality
Selected Countries in Sub-Saharan Africa, 2002-2005
Deaths of children under age 5 per 1,000 live births

- Kenya: 118 (With AIDS) vs. 98 (Without AIDS)
- Lesotho: 123 (With AIDS) vs. 71 (Without AIDS)
- Nambia: 78 (With AIDS) vs. 43 (Without AIDS)
- South Africa: 74 (With AIDS) vs. 43 (Without AIDS)
- Swaziland: 143 (With AIDS) vs. 73 (Without AIDS)
- Zimbabwe: 117 (With AIDS) vs. 78 (Without AIDS)


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