Chapter 8

Human Capital: Education and Health in Economic Development
The Central Roles of Education and Health

• Health and education are important objectives of development
• Health and education are also important components of growth and development – inputs in the aggregate production function
• Dual role as inputs and outputs gives health and education their central importance in economic development.
The Central Roles of Education and Health

• Very dramatic improvements in world health and education over past half century
  – 1950, child mortality was 280 per 1000 births in developing world
  – 2002, it was 120/1000 in low-income countries; 37/1000 in middle-income countries
  – Major childhood illnesses largely controlled
  – Significant improvement in literacy rates and basic education to majority of people in developing countries

• Despite these achievements, the developing world still faces challenges in improving health and education of its people.
Education and Health as Joint Investments for Development

• These are investments in the same individual.
• Greater health capital may improve the returns to investments in education
  – Health is a factor in school attendance
  – Healthier students learn more effectively
  – A longer life raises the rate of return to education
  – Healthier people have lower depreciation of education capital
• Greater education capital may improve the returns to investments in health
  – Public health programs need knowledge learned in school
  – Basic hygiene and sanitation may be taught in school
  – Education needed in training of health personnel
Improving Health and Education: Why Increasing Incomes Is Not Sufficient

• Health and education much higher in high-income countries

• Causality might runs in both directions
  – With higher income, people and governments can afford to spend more on education and health
  – With greater health and education, higher productivity and income are possible.

• Development policy needs to focus on all 3 simultaneously.

• Evidence shows that increases in income often do not lead to substantial increases in investment in children’s education and health
  – Low estimated income elasticity of demand for calories for low income households
  – Policies to increase income of poor w/o focus on how they are spent may not lead to improved health, and successful development more generally
  – Better educated mothers tend to have healthier children at any income level.
Improving Health and Education: Why Increasing Incomes Is Not Sufficient

• Better health status and nutrition affects school performance
  – Earlier and longer school enrolment; better school attendance; more effective learning.
  – Probability of attending school among nutritionally stunted children in Nepal is 5% but rises to 27% for non-stunted.
  – Undernourished children found to lag 20% in test scores in northeast Brazil

• To improve effectiveness of schooling, improve health of children in developing countries
  – Deworming of parasite-infected schoolchildren in Kenya significantly improved their school attendance and other outcomes.
Improving Health and Education: Why Increasing Incomes Is Not Sufficient

• Significant market failures in education and health require policy action
  – Spillover benefits to investment in one’s health or education
  – Cannot count on market to deliver socially efficient levels of health and education

• WHO (2000) concluded in its 2000 *World Health Report* that:
  – ultimate responsibility for the performance of a country’s health system lies with government.
Investing in Education and Health: The Human Capital Approach

• Initial investments in health or education lead to a stream of higher future income
• The present discounted value of this stream of future income is compared to the costs of the investment
• Private returns to education are high, and may be higher than social returns, especially at higher educational levels.
Age-Earnings Profiles by Level of Education: Venezuela

Financial Trade-Offs in the Decision to Continue in School

![Graph showing the financial trade-offs between direct and indirect costs, benefits, and earnings over age. The graph illustrates the increase in earnings for secondary and primary graduates compared to direct costs from age 13 to 66 years old.]

- Benefits shaded area increases with age, indicating higher earnings for graduates.
- Direct costs are shown as a horizontal bar at age 13 and 17, indicating the initial investment.
Sample Rates of Return to Investment in Education by Level of Education, Country, Type, and Region

<table>
<thead>
<tr>
<th>Country Type and Region</th>
<th>Social Rate of Return (%)</th>
<th>Private Rate of Return (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary</td>
<td>Secondary</td>
</tr>
<tr>
<td>Developing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Asia</td>
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<td>13</td>
</tr>
<tr>
<td>Latin America</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Developed</td>
<td>14</td>
<td>10</td>
</tr>
</tbody>
</table>


Note: How these rates of return were calculated is explained in detail note 20 at the end of this chapter.
Child Labor

• Child labor is a widespread phenomenon
• The problem may be modeled using the “multiple equilibria” approach
• Government intervention may be called for to move to a ‘better’ equilibrium
• Sometimes this shift can be self-enforcing, so active intervention is only needed at first
Assumptions of the Child Labor Multiple Equilibria Model

• Luxury Axiom: A household with sufficiently high income would not send its children to work

• Substitution Axiom: Adult and child labor are substitutes, in which the quantity of output by a child is a given fraction of that of an adult: \( Q^C = \gamma Q^A, \; 0 < \gamma < 1 \).
Child Labor as a Bad Equilibrium

Other approaches to child labor policy

• Get more children into school (as in Millennium Development Goals), e.g. new village schools; and enrollment incentives for parents such as in PROGRESA
• Consider child labor an expression of poverty, so emphasize ending poverty generally (a traditional World Bank approach)
• If child labor is inevitable in the short run, regulate it to prevent abuse and provide support services for working children (UNICEF approach)
• Ban child labor; or if impossible, ban child labor in its most abusive forms (ILO strategy; “Worst Forms of Child Labor Convention”)
• Activist approach: trade sanctions. Concerns: could backfire when children shift to informal sector; and if export sector growth slows
The Gender Gap: Discrimination in Education and Health

• Young females receive less education than young males in nearly every low and lower-middle income developing country

• Closing the educational gender gap is important because:
  — The social rate of return on women’s education is higher than that of men in developing countries
  — Education for women increases productivity, lowers fertility
  — Educated mothers have a multiplier impact on future generations
  — Education can break the vicious cycle of poverty and inadequate schooling for women

• Good news: Millennium Development Goals on parity being approached, progress in every developing region.
Youth Literacy Rate, 2008

## Ghana

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
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<tr>
<td><strong>Gross enrolment rate (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>86.3</td>
<td>87.5</td>
<td>92.1</td>
<td>93.7</td>
<td>95.2</td>
<td>94.9</td>
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<tr>
<td>Northern region</td>
<td>70.5</td>
<td>72.7</td>
<td>76.2</td>
<td>77.6</td>
<td>92.1</td>
<td>93.5</td>
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<tr>
<td>Upper East region</td>
<td>77.1</td>
<td>80.4</td>
<td>84.4</td>
<td>84.3</td>
<td>96.9</td>
<td>94.1</td>
</tr>
<tr>
<td>Upper West region</td>
<td>74.1</td>
<td>77.3</td>
<td>81.1</td>
<td>81.5</td>
<td>98.1</td>
<td>100.0</td>
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<tr>
<td><strong>Net enrolment rate (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>55.6</td>
<td>59.1</td>
<td>69.2</td>
<td>81.1</td>
<td>83.7</td>
<td>88.5</td>
</tr>
<tr>
<td>Northern region</td>
<td>49.0</td>
<td>52.4</td>
<td>65.4</td>
<td>67.5</td>
<td>71.8</td>
<td>84.0</td>
</tr>
<tr>
<td>Upper East region</td>
<td>53.2</td>
<td>55.5</td>
<td>69.0</td>
<td>72.8</td>
<td>77.7</td>
<td>80.7</td>
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<tr>
<td>Upper West region</td>
<td>49.7</td>
<td>54.5</td>
<td>70.0</td>
<td>70.1</td>
<td>77.2</td>
<td>79.1</td>
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</tbody>
</table>
## Ghana

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youth literacy rate (15-24 years)</td>
<td>80</td>
<td>76</td>
</tr>
<tr>
<td>Gross primary school enrolment ratio</td>
<td>98</td>
<td>97</td>
</tr>
<tr>
<td>Net primary school enrolment ratio</td>
<td>73</td>
<td>71</td>
</tr>
<tr>
<td>Gross secondary school enrolment ratio</td>
<td>52</td>
<td>46</td>
</tr>
<tr>
<td>Net secondary school enrolment ratio</td>
<td>47</td>
<td>43</td>
</tr>
</tbody>
</table>

1. Including adult literacy rate.
The Gender Gap: Discrimination in Education and Health (cont’d)

• Consequences of gender bias in health and education
  – Economic incentives and their cultural setting
    • Boys provide future economic benefits; receipts of dowry upon marriage in rural Asia; more educated girls may be considered “less marriageable.”
  – “Missing Women” mystery in Asia
    • Far fewer females (share) than predicted by demographic norms
    • More than 100 million missing. (female infanticide, selective abortion)
Female-Male Ratios in Total Population in Selected Communities

The Gender Gap: Discrimination in Education and Health (cont’d)

• Greater mother’s education generally improves prospects for both her son’s & daughter’s health and education
• Increase in family income does not always lead to better health and education
• No guarantee that higher health or education will lead to higher productivities and incomes
• Much depends on whether gains from income growth and also benefits of public investments in health and education and other infrastructure are shared equitably.
Educational Systems and Development

• The Political Economy of Educational Supply and Demand
  – The Relationship between Employment Opportunities and Educational Demands
    • As employment opportunities diminish (for given level of education) demand for higher education increases putting pressure on government to expand educational facilities at the higher level
    • Problem of educational certification with no commensurate increases in productivity
    • Worsens urban-rural gap; unemployment at all levels of education.
Educational Systems and Development

• Social versus Private Benefits and Costs
  – Widening gap between social and private costs at higher levels of education
    • Stimulates even greater demand for higher education.
  – More resources misallocated to educational expansion (in terms of social costs) means diminished potential for creating new jobs.
  – Provide education up to where marginal social costs equal marginal social returns
    • Basic education? Secondary education?
  – Devote resources for expanding education system to rural public works or on increasing quality of basic education in rural areas.
Private versus Social Benefits and Costs of Education: An Illustration

(a) Private returns and costs

(b) Social returns and costs
Educational Systems and Development

• Distribution of Education
  – Unequal distribution of education in developing countries
  – When quality (teaching, facilities, curricula, etc.) is considered, inequality much greater
  – Gender disparities are evident
  – Quantity and quality differentials explains differential earnings and productivity (Behrman and Birdsall, 1983).
Lorenz Curves for Education in India and South Korea

(a) Schooling in India
Cumulative proportion of population, 15 and over (%)
Mean = 2.95 years; education Gini = 0.69

(b) Schooling in South Korea
Cumulative proportion of population, 15 and over (%)
Mean = 10.04 years; education Gini = 0.22

Education Lorenz Curves for Ghana

Ghana

Cumulative proportion of years of schooling
Cumulative proportion of population

45° line
All (Gini=.466)
Male (Gini=.398)
Female (Gini=.523)
Education Lorenz Curves for Ghana
Education Lorenz Curves for Ghana

Rural

- 45° line
- All (Gini=.552)
- Male (Gini=.476)
- Female (Gini=.607)
Gini Coefficients for Education in 85 Countries

Ghana: Average years of schooling

<table>
<thead>
<tr>
<th>Location</th>
<th>All (Years)</th>
<th>Male (Years)</th>
<th>Female (Years)</th>
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<tr>
<td>Ghana</td>
<td>5.6</td>
<td>6.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Accra</td>
<td>8.9</td>
<td>8.1</td>
<td>7.9</td>
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<tr>
<td>Urban coastal</td>
<td>8.9</td>
<td>8.9</td>
<td>7.1</td>
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<tr>
<td>Urban forest</td>
<td>7.7</td>
<td>7.7</td>
<td>6.9</td>
</tr>
<tr>
<td>Urban savannah</td>
<td>6.6</td>
<td>6.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Rural coastal</td>
<td>6.6</td>
<td>5.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Rural forest</td>
<td>5.6</td>
<td>5.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Rural savannah</td>
<td>2.1</td>
<td>2.7</td>
<td>1.5</td>
</tr>
</tbody>
</table>

The graph above illustrates the average years of schooling for different regions in Ghana, categorized by gender. The data shows a general trend of higher years of schooling among males across all regions compared to females.
# Education Ginis for Ghana

<table>
<thead>
<tr>
<th></th>
<th>Gini coefficient</th>
<th>Female-male Gini diff (%)</th>
<th>Percent contribution to total Gini coefficient</th>
<th>contribution to within inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>National</td>
<td>0.47</td>
<td>0.40</td>
<td>0.52</td>
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<td>0.25</td>
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<td>Rural</td>
<td>0.55</td>
<td>0.48</td>
<td>0.61</td>
<td>27.4</td>
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<tr>
<td>Ecological zone</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Coastal</td>
<td>0.33</td>
<td>0.26</td>
<td>0.39</td>
<td>52.2</td>
</tr>
<tr>
<td>Forest</td>
<td>0.37</td>
<td>0.30</td>
<td>0.43</td>
<td>42.3</td>
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<tr>
<td>Savannah</td>
<td>0.74</td>
<td>0.67</td>
<td>0.81</td>
<td>20.6</td>
</tr>
<tr>
<td>Locality</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Accra</td>
<td>0.23</td>
<td>0.19</td>
<td>0.27</td>
<td>39.0</td>
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<td>0.28</td>
<td>0.21</td>
<td>0.33</td>
<td>55.6</td>
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<tr>
<td>Urban forest</td>
<td>0.28</td>
<td>0.22</td>
<td>0.33</td>
<td>50.4</td>
</tr>
<tr>
<td>Urban savannah</td>
<td>0.57</td>
<td>0.48</td>
<td>0.64</td>
<td>34.6</td>
</tr>
<tr>
<td>Rural coastal</td>
<td>0.43</td>
<td>0.31</td>
<td>0.52</td>
<td>68.6</td>
</tr>
<tr>
<td>Rural forest</td>
<td>0.39</td>
<td>0.32</td>
<td>0.46</td>
<td>44.1</td>
</tr>
<tr>
<td>Rural savannah</td>
<td>0.79</td>
<td>0.72</td>
<td>0.85</td>
<td>18.0</td>
</tr>
</tbody>
</table>
Educational Systems and Development (cont’d)

• Education, Inequality, and Poverty
  – Education inequality reinforces income inequality
    • Poor students can’t enroll in secondary school and university
    • Private costs of primary education higher and expected benefits lower for poor students => lower rate of return => more likely to dropout; exacerbates inequality.
  – Inequality in developing country educational systems compounded at university level
    • Subsidized tuition, etc. for students who already in higher income brackets = transfer payments from poor to wealthy in the name of “free” higher education
    • Studies show that children of “white-collar” families receive disproportionate public educational benefits.
Educational Systems and Development (cont’d)

• Education, Internal Migration, and the Brain Drain
  – Influences rural-urban migration
  – International migration of high-level educated workers- brain drain
    • Entails considerable social costs
    • Some argue that they send remittances
Some problems of developing country education systems

• Children learn much less in school than the curriculum states they should learn. Lack of needed logistics for effective teaching and learning (most basic equipment and school supplies such as textbooks, blackboards, desks, classrooms).

• Grade repetition and leaving school at an early age (dropout) are common.

• Teacher quality and availability is a common problem: Most teachers are not trained and teacher shortages are high, resulting in very high student-teacher ratios.

• Teachers often have weak incentives: This results in low morale and does not encourage teachers to “give off their best”.

• Teacher absenteeism is high. Beyond absence, many “present” teachers do not actually do effective teaching most of the time.

• Quality of education has deteriorated because expansion in educational investment and infrastructure has lagged behind growth in the population of school going age: There is congestion affecting quality
Some problems of developing country education systems

• Performance of students on achievement tests administered within many of these countries suggests that academic achievement is often very low.
  – For example, a study in 1999 found that in Bangladesh, 58 percent of a sample of rural children aged 11 and older failed to identify seven of eight presented letters.
  – Another study also found that in Ghana, the mean score of primary 6 pupils on a very simple multiple-choice reading test was 25 percent, the score one would expect from random guessing (Glewwe, 1999).
Health Measurement and Distribution

• World Health Organization (WHO): The key United Nations agency concerned with global health matters
  – Defines health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”
  – As with income and education, the distribution of health among the population, not just averages, is what matters.
Life Expectancy in Various World Regions

![Graph showing life expectancy trends in different regions from 1980 to 2003.](image)

Under-5 Mortality Rates in Various World Regions

Deaths of Children under Age 5

Children’s Likelihood to Die in Selected Countries

Proportion of Under-Five Children Who Are Underweight, by Household Wealth, around 2008

Disease Burden

• Developing countries face a much more crippling disease burden than developed countries, especially regarding infectious diseases.
  – HIV/AIDS
  – Malaria
  – Parasitic Worms and Other “Neglected Tropical Diseases”

• Africa faces greatest challenge
  – WHO finds that 5 conditions- acute respiratory infections, diarrhea, measles, malaria & malnutrition- account for 70% of deaths among children <5yrs
  – If trend continues, Africa alone will account for 30% of childhood deaths by 2020
Proportion of Children under 5 Who Are Underweight, 1990 and 2005

## Regional HIV and AIDS Statistics, 2009

<table>
<thead>
<tr>
<th>Region</th>
<th>Adults and Children Living with HIV</th>
<th>Adults and Children Newly Infected with HIV</th>
<th>Adult and Child Deaths Due to AIDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Saharan Africa</td>
<td>22.4 million</td>
<td>1.9 million</td>
<td>1.4 million</td>
</tr>
<tr>
<td>Middle East and North Africa</td>
<td>310,000</td>
<td>35,000</td>
<td>20,000</td>
</tr>
<tr>
<td>South and Southeast Asia</td>
<td>3.8 million</td>
<td>280,000</td>
<td>270,000</td>
</tr>
<tr>
<td>East Asia</td>
<td>850,000</td>
<td>75,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Oceania</td>
<td>59,000</td>
<td>3,900</td>
<td>2,000</td>
</tr>
<tr>
<td>Latin America</td>
<td>2 million</td>
<td>170,000</td>
<td>77,000</td>
</tr>
<tr>
<td>Caribbean</td>
<td>240,000</td>
<td>20,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Eastern Europe and Central Asia</td>
<td>1.5 million</td>
<td>110,000</td>
<td>87,000</td>
</tr>
<tr>
<td>Western and Central Europe</td>
<td>850,000</td>
<td>30,000</td>
<td>13,000</td>
</tr>
<tr>
<td>North America</td>
<td>1.4 million</td>
<td>55,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Total</td>
<td>33.4 million</td>
<td>2.7 million</td>
<td>2 million</td>
</tr>
</tbody>
</table>

Source: Adapted from *2009 AIDS Epidemic Update*, p. 11. © 2009 Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO).
# The Major Neglected Tropical Diseases, Ranked by Prevalence

<table>
<thead>
<tr>
<th>Disease</th>
<th>Global Prevalence (millions)</th>
<th>Population at Risk</th>
<th>Regions of Highest Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascariasis</td>
<td>807</td>
<td>4.2 billion</td>
<td>East Asia and Pacific Islands, sub-Saharan Africa, India, South Asia, China, Latin America and Caribbean</td>
</tr>
<tr>
<td>Trichuriasis</td>
<td>604</td>
<td>3.2 billion</td>
<td>Sub-Saharan Africa, East Asia and Pacific Islands, Latin America and Caribbean, India, South Asia</td>
</tr>
<tr>
<td>Hookworm infection</td>
<td>576</td>
<td>3.2 billion</td>
<td>Sub-Saharan Africa, East Asia and Pacific Islands, India, South Asia, Latin America and Caribbean</td>
</tr>
<tr>
<td>Schistosomiasis</td>
<td>207</td>
<td>779 million</td>
<td>Sub-Saharan Africa, Latin America and Caribbean</td>
</tr>
<tr>
<td>Lymphatic filariasis</td>
<td>120</td>
<td>1.3 billion</td>
<td>India, South Asia, East Asia and Pacific Islands, sub-Saharan Africa</td>
</tr>
<tr>
<td>Trachoma</td>
<td>84</td>
<td>590 million</td>
<td>Sub-Saharan Africa, Middle East and North Africa</td>
</tr>
<tr>
<td>Onchocerciasis</td>
<td>37</td>
<td>90 million</td>
<td>Sub-Saharan Africa, Latin America and Caribbean</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>12</td>
<td>350 million</td>
<td>India, South Asia, sub-Saharan Africa, Latin America and Caribbean</td>
</tr>
<tr>
<td>Chagas’ disease</td>
<td>8–9</td>
<td>25 million</td>
<td>Latin America and Caribbean</td>
</tr>
<tr>
<td>Leprosy</td>
<td>0.4</td>
<td>N.D.</td>
<td>India, sub-Saharan Africa, Latin America and Caribbean</td>
</tr>
<tr>
<td>Human African trypanosomiasis</td>
<td>0.3</td>
<td>60 million</td>
<td>Sub-Saharan Africa</td>
</tr>
<tr>
<td>Dracunculiasis</td>
<td>0.01</td>
<td>N.D.</td>
<td>Sub-Saharan Africa</td>
</tr>
<tr>
<td>Buruli ulcer</td>
<td>N.D.</td>
<td>N.D.</td>
<td>Sub-Saharan Africa</td>
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</table>

Source: “Control of neglected tropical diseases,” by Peter Hotez et al., New England Journal of Medicine, 357: 1018–1027 (September 6, 2007). Copyright © 2007 Massachusetts Medical Society. All rights reserved. Note: N.D. = not determined.
Health, Productivity, and Policy

• Productivity
  – Is there a connection? Most certainly yes.
    • Studies show that healthier people earn higher wages (Cote d’Ivoire)
      – Daily wage estimated to be about 19% lower among men whose health status makes them likely to lose a day of work per month because of illness
    • Careful statistical methods have shown that large part of effect of health on raising earnings is due to productivity differences (eg. Bangladesh)
    • Reverse causality not confirmed though
Wages, Education, and Height of Males in Brazil and the United States


*Note:* In (wage) stands for natural log of wage.
Health, Productivity, and Policy

• Health Systems Policy
  – Great variability in the performance of health systems at each income level
GNI Per Capita and Life Expectancy at Birth, 2002

Some problems of developing country health systems

- Fewer health facilities compared to developed countries, and facilities often in very poor state.
- There are high patient-doctor and high patient-nurse ratios as a result of inadequacy of health personnel.
- Per capita public expenditures on health care are also much smaller in developing than in developed countries.
- Private health facilities are few and mainly located in urban areas and are generally afforded by the wealthy.
- There are also a number of indigenous (traditional) medical practitioners (particularly, herbalists) of various kinds in developing countries.
- Health services are unevenly distributed among the population: rural areas usually lack the availability of health centers and personnel.
- There is often a lot of congestion at health facilities, particularly public facilities, because of the fewness of the facilities relative to the size of the population.
Policies for Health, Education, and Income Generation

• Evidence clear that health and education are joint investments

• Need for integrated policy approach
  – Most effective investment can make in education quality is to improve child health
  – Most effective investments can make in health may be to improve quality of education

• Number of prominent poverty programs using this approach to develop human capital among low income families
  – PROGRESSA